THE
IDEAL
FITTER

DICK [illegible]

5^{00}

Mike Jordan 1989

Property of
Dick Martin

Jack to keep hands
off.

TMc 8/20/30

AMERICAN RADIATOR BUILDING

40 West 40th Street *New York City*

THE IDEAL FITTER

FIFTY-FOURTH
EDITION
1929

AMERICAN RADIATOR COMPANY

Copyright 1929

AMERICAN RADIATOR COMPANY

GENERAL OFFICES.................40 West 40th Street, New York
WESTERN EXECUTIVE OFFICE.....816 S. Michigan Avenue, Chicago
EXPORT DEPARTMENT............40 West 40th Street, New York

Cable Address: Radiators, New York. *Codes:* Bentley's Complete Phrase and The Ideal Fitter

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Terminal Jacketing & Enameling
Plant, Buffalo, New York

THE IDEAL FITTER

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FOREWORD

IT is with special pleasure that we publish this edition of the Ideal Fitter.

The products herein described embody every improvement and refinement that our best ability and entire resources have made possible. In their respective fields they represent the highest standard of excellence.

We believe that these American Radiator products will enable our good friends in the trade to obtain a steadily enlarging number of customers, offer greater community service, and reap commensurately larger rewards.

Gladly do we take this opportunity to thank our many friends, contractors, and wholesale distributors for their many kind suggestions. We wish them, one and all, great happiness and prosperity for the years to come.

Faithfully,

AMERICAN RADIATOR COMPANY

HEATING BOILER OUTPUTS

GLADLY responsive to a suggestion from a large number of heating contractors, we are resuming our former practice of showing several different B.t.u. outputs (or ratings) produced by each and every HARD COAL burning Ideal Boiler resulting from burning the coal charge at different speeds or time periods, to take the place of the practice of allotting to each HARD COAL burning boiler one single chosen output and specifying same as rating with its one single restricted time period during which the coal charge must be burned to produce the specified rating.

CERTIFICATION

All Ideal Boilers are CONSTRUCTED according to the low pressure heating boiler Code of the American Society of Mechanical Engineers.

GUARANTEED OUTPUT AND PERFORMANCE DATA

The output and performance data of each and every Ideal Heating Boiler has been evolved by tests made in conformance with the Manufacturers and Heating Engineers Output STANDARDS and is guaranteed in accordance therewith.

MANUFACTURERS AND HEATING CONTRACTORS OUTPUT STANDARDS

In order to be able to examine and to compare the qualities of performance and the output of ALL makes and sizes of ALL solid fuel burning heating boilers—the manufacturers established—especially for test comparison purpose—a standard heat value of 12,500 B.t.u. per pound for HARD coal and 13,000 B.t.u. per pound for soft coal (see curve on chart on page A13, showing the percentage of decrease of the OUTPUTS of all Ideal Boilers when burning solid fuel having heat values less than 12,500 for hard coal).

Also a uniform pressure when testing boilers—of—for steam 2 pounds gauge pressure = 219° F. temperature—and for water 180° F. water temperature.

Manufacturers further decided to express all heating boiler OUTPUTS in B.t.u. and also in square feet of direct cast iron radiators—selecting as a standard an arbitrary heat emission of 240 B.t.u. for steam and 150 B.t.u. for water radiators per square foot of surface per hour.

All Ideal Boiler HARD COAL burning outputs are based on the use of HARD COAL of commercial size best suited to the boiler, moisture free, 12,500 B.t.u. heat value, steam at 2 pounds pressure and chimney dimensions as specified.

All Ideal Boiler SOFT COAL burning outputs are based on the use of SOFT COAL, free burning or caking 3″ x 2″ lump size, moisture free, 13,000 B.t.u. heat value, steam at 2 pounds pressure and chimney dimensions as specified, with stoking and firing attention as required.

All Ideal Boiler OIL BURNING outputs are based on the use of commercial fuel oil 19,000 B.t.u. heat value per pound.

All Ideal Gas Boiler outputs have been approved by the American Gas Association Laboratory and are actual B.t.u. outputs at boiler when burning the quantity of any gas shown on page A175.

Burning Hard Coal Fast and Slow

It is obvious that upon the number of hours spent in burning the HARD COAL charge depends the B.t.u. output (or rating) of the heating boiler; or in other words, a boiler with drafts regulated to burn its hard coal charge in SIX hours will produce approximately two times the B.t.u. output (or rating) that it will when regulated to burn its hard coal charge in TWELVE hours, and when burning its HARD COAL charge in EIGHTEEN hours will produce relatively one-third of the output (or rating) that it would when burning the same charge in SIX hours. Accordingly the practice of allotting to a coal burning heating boiler one specific chosen B.t.u. output and specifying same as RATING appears to be a misnomer.

The outputs along the top of the HARD COAL BOILER PERFORMANCE DATA, printed in RED for steam and in Black for water boilers, show the boiler performance when burning the hard coal charge in different numbers of hours from slow to fast.

The STEAM and WATER outputs for Hard Coal Boilers along the top directly above the performance data, enclosed between the heavy vertical lines are—RECOMMENDED OUTPUTS BASED ON AN ATTACHED EQUIVALENT DIRECT STEAM RADIATOR AND PIPING (240 B.t.u.) LOAD—AND ALSO ON AN ATTACHED EQUIVALENT DIRECT WATER RADIATOR AND PIPING (150 B.t.u.) LOAD FOR THE BOILER SELECTION.

How to Select the Hard Coal Ideal Steam Boiler

EXAMPLE—Total estimated load of equivalent direct steam radiation plus piping equals 850 (240 B.t.u.) square feet. To select a boiler to fully accord with the practice of the purchaser (heating contractor) for this load, turn to page A43. At top of page select the output nearest to the equivalent direct steam radiation and piping LOAD given in this example (850 square feet), then follow down the column containing the selected output to where the column is enclosed between heavy vertical lines; then follow to the left margin where, printed in RED is the recommended boiler, 2-S-8 REDFLASH, which is adequate to quickly pick up and supply the given load under all conditions.

How to Select the Hard Coal Ideal Water Boiler

EXAMPLE—Total estimated load of equivalent direct water radiation plus piping equals 1360 (150 B.t.u.) square feet. To select a boiler to fully accord with the practice of the purchaser for this load turn to page A43. At top of page select the output nearest to the equivalent direct water radiation and piping LOAD given in the example (1360 square feet)—then follow down the column containing the selected output to where the column is enclosed between heavy vertical lines, then follow to the left margin where, printed in BLACK for water is the recommended boiler, 2-W-8 REDFLASH, which is adequate to quickly pick up and supply the given load under all conditions.

How to Select the Soft Coal Ideal Heating Boiler—Steam and Water

We also endeavored to submit similar tables showing a number of different B.t.u. outputs produced by our line of SOFT COAL burning Ideal Boilers, but an extensive experience of many years convinces us that the making of such tables for SOFT COAL is impracticable owing to its many types, qualities, characteristics and structures, and the frequent attention and firing periods necessary for its best expression.

The SOFT COAL performance data of Ideal Smokeless Steam and Water Boilers shows recommended Ideal Boiler SELECTION outputs for total loads of equivalent direct steam radiators and piping (240 B.t.u.) and equivalent direct water radiators and piping (150 B.t.u.) BASED ON POUNDS OF SOFT COAL BURNED PER SQUARE FOOT OF GRATE PER HOUR AS FOLLOWS:

Years of experience has proved that FIVE pounds burned per square foot of grate per hour for small Ideal heating boilers, and EIGHT pounds burned per square foot of grate for large Ideal heating boilers, is a practical and dependable rate of burning for the SELECTION OF SOFT COAL Ideal Boilers.

How to Select the Oil Burning Ideal Heating Boiler—Steam and Water

A similar, dependable method of selecting Oil Burning Boilers has also been developed. The various outputs shown are based on heat transmission rates of 3,000, 4,000, 5,000 and 6,000 B.t.u. absorbed per square foot of boiler heating surface per hour when attached to a tight chimney of dimensions specified for oil burning Ideal Boilers.

The effect of burning OIL fuel at different rates in a heating boiler is similar to that when burning hard coal fast and slow as described on page A8. For the greater the combustion, the more oil is burned in a given time and the more heat is absorbed by the heating surface and is transmitted to the water in the boiler.

Each square foot of boiler heating surface must absorb and transmit to the water a specific amount of heat from the oil burned per hour in order to maintain a specific output per hour.

If the output per hour must be increased, then more pounds of oil must be burned per hour and each and every square foot of heating surface must absorb and transmit to the water more heat (B.t.u.) per hour—in other words the HEAT TRANSMISSION RATE per square foot of heating surface then increases.

Recommendations as to the minimum burner capacity in pounds of oil per hour for the desired output are shown. This method of presenting oil burning Ideal Boiler outputs enables the heating contractor to select a boiler with a comprehensive regard for the efficiency desired.

To enable selecting the proper size of oil burning boiler for any total load the recommended boilers are enclosed between heavy vertical lines in the performance data tables and are based upon average operating capacities and efficiencies of burner and boiler based on calorific value of 19,000 B.t.u. per pound.

IDEAL OIL BURNING BOILER OUTPUTS GUARANTEED

The outputs listed are guaranteed with the boiler operating at a steam pressure of 2 pounds—or a water (boiler) temperature of 180 deg. Fahr. and with the burner economically burning the quantity of fuel (19,000 B.t.u. per pound) listed under Minimum Burner Capacities specified and with the boiler attached to a properly constructed tight chimney having dimensions SPECIFIED.

IMPORTANT—Incident to warranting Ideal oil burning boiler outputs, the chimney SPECIFIED should serve the boiler ONLY and should be free from the hampering effects of adverse air currents.

BOILER SELECTION

To insure selecting an ADEQUATE size of Ideal Oil Burning Boiler due consideration should be given to the heat loss from the piping of the heating installation and also to the ADDITIONAL boiler capacity necessary for the estimated pick-up or cold starting load. Accordingly, to the total radiator and piping (240 B.t.u. steam or 150 B.t.u. water) load add 25% for pick-up or cold starting load after which select boiler from the outputs given between the heavy lines on performance data.

In every case, selection of the boiler with a moderate transmission rate will always result in economical operation. It is of course essential that the oil burner is capable—properly and economically—of burning the quantity of oil listed in the table within the combustion space available in the boiler.

How to Select the Ideal Gas Boiler

Ideal Gas Boilers meet all requirements of the American Gas Association in regard to safety, efficiency, construction, operation and selection.

SELECTION outputs listed have been approved by the A. G. A. Laboratory.

Unlike solid fuel burning boilers which may burn fuels of widely varying characteristics, gas boilers burn a fuel of uniform characteristics at a fixed rate and develop a uniform output at all times.

Gas boilers should, therefore, be selected with an output as near to the actual heat requirement of the installation as possible.

Recommended attached direct radiation loads, page A174, are based upon selection factors recommended by the American Gas Association and have been used successfully for several years in selecting Ideal Gas Boilers (see note bottom of page A174).

Gas consumption shown on page A175 for various kinds of gas is the gas burned when boiler is delivering continuous rated output, and, therefore, should not be used in estimating fuel bills.

Ideal Boiler Outputs

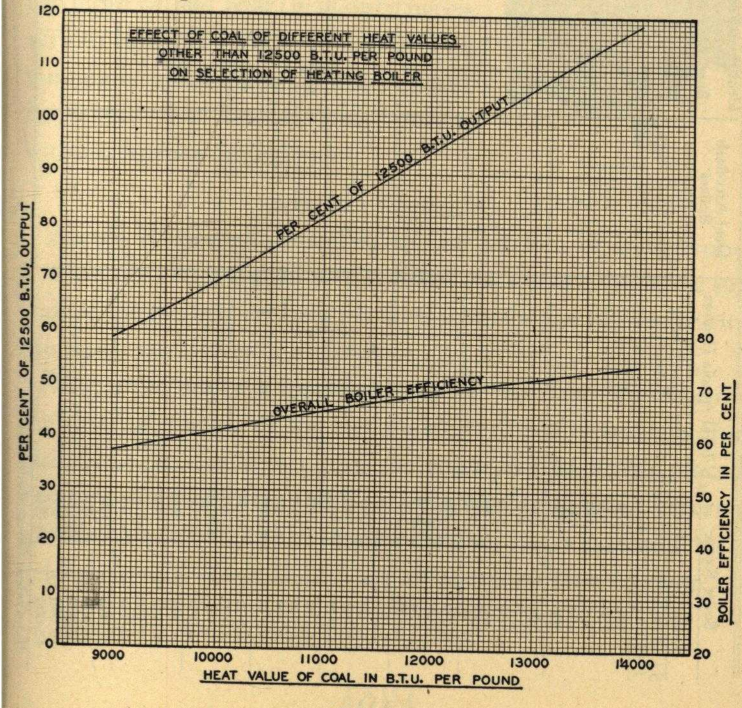
All Ideal Boiler outputs herein are based on Square Feet Direct cast iron column steam radiators at 240 B.t.u. and water radiators at 150 B.t.u. emission per square foot of surface per hour.

The term rating when applied to any single specific B.t.u. output of a heating boiler designed for and burning GAS or OIL is technically and commercially appropriate.

The term rating when applied to any single specific B.t.u. output of a heating boiler designed for and burning SOLID FUELS is a misnomer.

Oil or gas fuel—flows—under pressure and with uniform volume and heat value into the adequate gas or oil burning heating boiler—developing continuous, dependable maximum B.t.u. output.

Oil or gas fuel contains a uniform, volatile content, which enables supplying it constantly with the requisite quantity of air for complete combustion, practically independent of chimney conditions; moreover its automatic flow into the boiler is either all on or all off, according to heat requirement.



SOLID FUEL BOILER RANGE INDEX

Boiler Range		Ideal Arcola Heaters Burn All Solid Fuels (For Water Only)	Ideal Arcoflash Boilers Burn All Fuels	Ideal Arco Round Boilers Burn All Fuels		Ideal Redflash Boilers and Special Smokeless Type			Ideal Water Tube and Smokeless Boilers		
Steam	Water										
Sq. Ft. Edr.* (240 B.t.u.)	Sq. Ft. Edr.* (150 B.t.u.)	Page	Hard Coal Data Page	Hard Coal Page	Boiler Series	Hard Coal Page	Boiler Series No.	Soft Coal Page	Hard Coal Page	Boiler Series	Soft Coal Page
100	160	A16	....	A27	17″	A40	1	A89	....	....	....
200	320	A17	A22	A27, 28	17″, 19″	A40	1	A89	....	....	....
300	480	....	A22	A28, 29	19″, 20″	A40	1	A89	....	....	....
400	640	....	A23	A29, 30	20″, 22″	A41	1	A89	A64	23″	....
500	800	....	....	A30, 31	22″, 25″	A41, 42	1, 2	A89	A64	23″	....
600	960	....	....	A31	25″	A41, 42	1, 2	A89	A65, 67	23″, 29″	....
700	1,120	....	....	A32	28″	A42	2	....	A65, 67	23″, 29″	A102
800	1,280	....	....	A32	28″	A42	2	A90	A66, 67	23″, 29″	A102
900	1,440	....	....	....	....	A43	2	A90	A66, 67	23″, 29″	A102
1,000	1,600	....	....	....	....	A43, 45	2, 3	A90	A67	29″	A102,103
1,250	2,000	....	....	....	....	A44, 45	2, 3	A90	A67, 69	29″, 36″	A103
1,500	2,400	....	....	....	....	A45	2, 3	A90, 91	A68, 69	29″, 36″	A103
1,750	2,800	....	....	....	....	A45	3	A91	A68, 69	29″, 36″	A103
2,000	3,200	....	....	....	....	A45, 48	3, 4	A91	A69	36″	A103,104
2,250	3,600	....	....	....	....	A46, 48	3, 4	A91	A69	36″	A104
2,500	4,000	....	....	....	....	A46, 48	3, 4	A91	A69	36″	A104
2,750	4,400	....	....	....	....	A46, 48	3, 4	A91, 92	A70	36″	A104
3,000	4,800	....	....	....	....	A47, 48	3, 4	A91, 92	A70	36″	A104
3,250	5,200	....	....	....	....	A47, 48	3, 4	A91, 92	A70	36″	A104
3,500	5,600	....	....	....	....	A48	3, 4	A91, 92	A70	36″	A104
3,750	6,000	....	....	....	....	A49	4	A92	A71	36″	A104
4,000	6,400	....	....	....	....	A49, 51	4, 5	A92	A71	36″	A104
4,500	7,200	....	....	....	....	A50, 51	4, 5	A92, 93	A72, 73	36″, 48″	A104,105
5,000	8,000	....	....	....	....	A50, 51	4, 5	A92, 93	A73	48″	A105
5,500	8,800	....	....	....	....	A51	4, 5	A92, 93	A73	48″	A105
6,000	9,600	....	....	....	....	A51	5	A93	A73, 77	48″, 79″	A105,106
7,000	11,200	....	....	....	....	A52	5	A93	A73, 77	48″, 79″	A105,106
8,000	12,800	....	....	....	....	A53	5	A93	A74, 77	48″, 79″	A105,106
9,000	14,400	....	....	....	....	A53	5	A93	A75, 77	48″, 79″	A105,106
10,000	16,000	....	....	....	....	....	....	....	A76, 77	48″, 79″	A105,106
11,000	17,600	....	....	....	....	....	....	....	A76, 78	48″, 79″	A106
12,000	19,200	....	....	....	....	....	....	....	A78	79″	A106
13,000	20,800	....	....	....	....	....	....	....	A78	79″	A107
14,000	22,400	....	....	....	....	....	....	....	A79	79″	A107
15,000	24,000	....	....	....	....	....	....	....	A79	79″	A107

*Equivalent Direct Radiation.

IDEAL ARCOLA WATER BOILER

Patented

MORE than a half million people enjoy the economy and comfort of Arcola heating. It provides hot water radiator heating comfort for homes, stores, garages, and other small buildings with or without cellar.

An Arcola Automatic Heat Regulator may be installed on the Arcola at small additional cost. The regulator is placed at the rear of the Arcola and, for more or less heat, it is only necessary to turn the handle of a dial. The automatic mechanism then accurately maintains the desired heat output without further attention.

Boiler Outputs

Arcola is generally installed in the kitchen or living room but can also be installed in the cellar. As water completely surrounds the fire box and ash pit there is no danger of overheating the floor, and safety is assured.

Where the boiler is installed upstairs, the heat emitted from the external surface of the Arcola Heater itself is ample to furnish the heat requirements of the room in which it is placed. For Equivalent Direct (150 B.t.u.) Radiation of boiler external surface, outputs and performance data see pages A16 and 17.

Ideal Arcola Water Boilers are shipped complete in crate.

IDEAL ARCOLA WATER BOILERS—Performance Data

Number of Boiler	Output in Equivalent Direct Radiation (Sq. Ft.) Water (150 B.t.u.)*	100	150	200	250	300	350	400	450	500	550	600	650	700	750
	Output in (1000's) B.t.u. per Hr.	**15.0**	**22.5**	**30.0**	**37.5**	**45.0**	**52.5**	**60.0**	**67.5**	**75.0**	**82.5**	**90.0**	**97.5**	**105.0**	**112.5**
4-H Grate Area 0.67 Sq. Ft. Fuel Cap. 60 Lbs. Available Fuel 45 Lbs.	Time Available Fuel Will Last, Hrs.	22.9	15.6	11.8	9.4	7.7	...	...	...	...	...	...	...	...	...
	E. D. R. (150 B.t.u.)—Boiler External Surface*	45	45	45	45	45	...	...	...	...	...	...	...	...	...
	Efficiency of Boiler, %	61.0	62.4	62.9	62.5	61.7	...	...	...	...	...	...	...	...	...
	Stack Gas Temperature, °F	270	315	360	400	445	...	...	...	...	...	...	...	...	...
	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	2.9	4.3	5.7	7.2	8.7	...	...	...	...	...	...	...	...	...
	Draft Required, Ins. of Water	0.01	0.02	0.03	0.04	0.06	...	...	...	...	...	...	...	...	...
	Chimney Size, Ins.	8x8	8x8	8x8	8x8	8x8	...	...	...	...	...	...	...	...	...
	Chimney Height, Ft.	30	30	30	30	30	...	...	...	...	...	...	...	...	...
5-H Grate Area 0.90 Sq. Ft. Fuel Cap. 80 Lbs. Available Fuel 60 Lbs.	Time Available Fuel Will Last, Hrs.	30.8	21.0	15.9	12.7	10.5	8.9	7.6	...	...	...	...	...	...	...
	E. D. R. (150 B.t.u.)—Boiler External Surface*	50	50	50	50	50	50	50	...	...	...	...	...	...	...
	Efficiency of Boiler, %	61.5	63.0	63.5	63.4	62.9	61.9	60.7	...	...	...	...	...	...	...
	Stack Gas Temperature, °F	260	300	345	380	425	470	510	...	...	...	...	...	...	...
	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	2.2	3.2	4.2	5.3	6.4	7.5	8.8	...	...	...	...	...	...	...
	Draft Required, Ins. of Water	0.01	0.02	0.03	0.03	0.05	0.06	0.08	...	...	...	...	...	...	...
	Chimney Size, Ins.	8x8	8x8	8x8	8x8	8x8	8x8	8x8	...	...	...	...	...	...	...
	Chimney Height, Ft.	30	30	30	30	30	30	30	...	...	...	...	...	...	...
6-H Grate Area 1.13 Sq. Ft. Fuel Cap. 100 Lbs. Available Fuel 75 Lbs.	Time Available Fuel Will Last, Hrs.	...	26.3	20.0	16.0	13.3	11.3	9.7	8.5	7.4	...	...	...	...	...
	E. D. R. (150 B.t.u.)—Boiler External Surface*	...	55	55	55	55	55	55	55	55	...	...	...	...	...
	Efficiency of Boiler, %	...	63.2	64.0	64.1	63.8	63.2	62.1	60.9	59.5	...	...	...	...	...
	Stack Gas Temperature, °F	...	295	335	375	415	455	495	535	575	...	...	...	...	...
	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	...	2.5	3.3	4.1	5.0	5.9	6.8	7.8	8.9	...	...	...	...	...
	Draft Required, Ins. of Water	...	0.02	0.02	0.03	0.04	0.05	0.06	0.07	0.09	...	...	...	...	...
	Chimney Size, Ins.	...	8x8	8x8	8x8	8x8	8x8	8x8	8x8	8x8	...	...	...	...	...
	Chimney Height, Ft.	...	30	30	30	30	30	30	30	30	...	...	...	...	...

*Boiler outputs do not include Equivalent Direct Radiation (150 B.t.u.) of boiler external surface shown for each boiler assemblage.

IDEAL ARCOLA WATER BOILERS—Performance Data

Number of Boiler	Output in Equivalent Direct Radiation (Sq. Ft.) Water (150 B.t.u.)*	100	150	200	250	300	350	400	450	500	550	600	650	700	750
	Output in (1000's) B.t.u. per Hr.	15.0	22.5	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0	97.5	105.0	112.5
7-H	Time Available Fuel Will Last, Hrs.	...	31.8	24.2	19.4	16.2	13.8	11.9	10.4	9.2	8.2	7.3	...	...	...
Grate Area 1.36 Sq. Ft.	E. D. R. (150 B.t.u.)—Boiler External Surface*	...	60	60	60	60	60	60	60	60	60	60	...	...	...
	Efficiency of Boiler, %	...	63.7	64.5	64.8	64.7	64.2	63.5	62.6	61.5	60.2	58.4	...	...	...
Fuel Cap. 120 Lbs.	Stack Gas Temperature, °F	...	290	330	365	400	440	480	515	555	590	630	...	...	...
	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	...	2.1	2.7	3.4	4.1	4.8	5.6	6.3	7.2	8.1	9.1	...	...	...
Available Fuel 90 Lbs.	Draft Required, Ins. of Water	...	0.01	0.02	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.10	...	...	...
	Chimney Size, Ins.	...	8x8	8x8	8x8	8x8	8x8	8x8	8x8	8x8	8x8	8x8	...	...	...
	Chimney Height, Ft.	...	30	30	30	30	30	30	30	30	30	30	...	...	...
8-H	Time Available Fuel Will Last, Hrs.	...	...	28.4	22.9	19.1	16.3	14.1	12.4	11.0	9.8	8.8	7.9	...	...
Grate Area 1.59 Sq. Ft.	E. D. R. (150 B.t.u.)—Boiler External Surface*	...	...	65	65	65	65	65	65	65	65	65	65	...	...
	Efficiency of Boiler, %	...	...	65.0	65.4	65.4	65.1	64.5	63.7	62.7	61.6	60.4	59.0	...	...
Fuel Cap. 140 Lbs.	Stack Gas Temperature, °F	...	...	320	355	390	425	460	500	535	570	605	640	...	...
	Fuel Burned per Sq. Ft. of Grate Per Hr., Lbs.	...	...	2.3	2.9	3.5	4.1	4.7	5.3	6.0	6.7	7.5	8.3	...	...
Available Fuel 105 Lbs.	Draft Required, Ins. of Water	...	...	0.01	0.02	0.02	0.03	0.04	0.04	0.05	0.07	0.08	0.10	...	...
	Chimney Size, Ins.	...	...	8x8	8x8	8x8	8x8	8x8	8x8	8x8	8x8	8x8	8x8	...	...
	Chimney Height, Ft.	...	...	30	30	30	30	30	30	30	30	30	30	...	...
9-H	Time Available Fuel Will Last, Hrs.	...	...	...	26.4	22.0	18.8	16.3	14.4	12.7	11.4	10.2	9.3	8.4	7.7
Grate Area 1.82 Sq. Ft.	E. D. R. (150 B.t.u.)—Boiler External Surface*	...	...	...	70	70	70	70	70	70	70	70	70	70	70
	Efficiency of Boiler, %	...	...	...	66.0	66.0	65.8	65.3	64.6	63.7	62.6	61.4	60.2	58.9	57.4
Fuel Cap. 160 Lbs.	Stack Gas Temperature, °F	...	...	...	345	380	415	450	485	515	550	585	620	655	690
	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	...	...	...	2.5	3.0	3.5	4.0	4.6	5.2	5.8	6.4	7.1	7.8	8.6
Available Fuel 120 Lbs.	Draft Required, Ins. of Water	...	...	...	0.02	0.02	0.03	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.11
	Chimney Size, Ins.	...	...	...	8x8	8x8	8x8	8x8	8x8	8x8	8x8	8x8	8x8	8x8	8x8
	Chimney Height, Ft.	...	...	...	30	30	30	30	30	30	30	30	30	30	30

*Boiler outputs do not include Equivalent Direct Radiation (150 B.t.u.) of boiler external surface shown for each boiler assemblage.

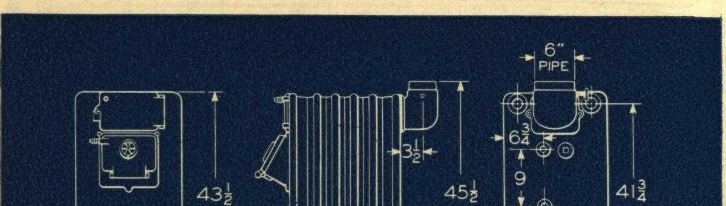
IDEAL ARCOLA WATER BOILER

Dimensions—Outlets—Inlets

Oval smoke pipe connection will take 6-inch diameter smoke pipe. Flow pipe tappings, 2-2 inches. Return pipe tapping, 1-2 inch.

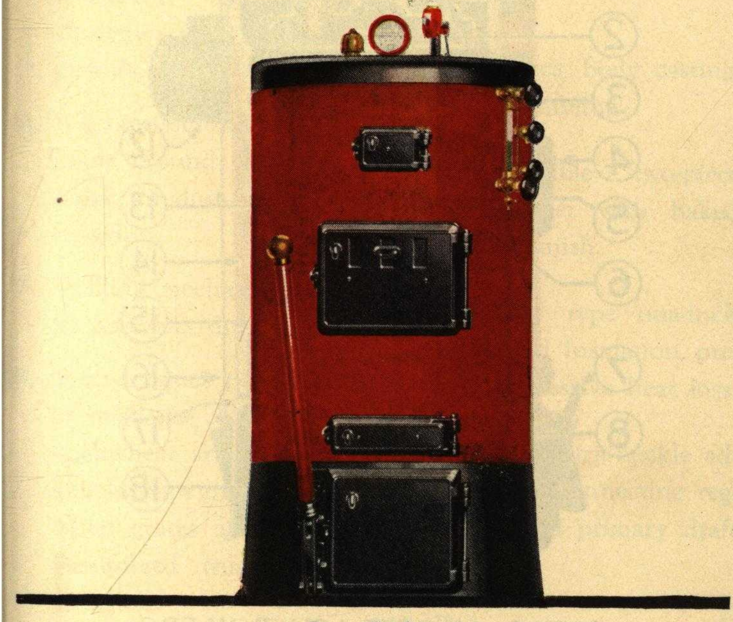
Number of Boiler	Number of Sections	Length "L" Inches	Fuel Capacity Pounds
No. 4H	4	12	60
No. 5H	5	15	80
No. 6H	6	18	100
No. 7H	7	21	120
No. 8H	8	24	140
No. 9H	9	27	160

Trade-marks Ideal and Arcola, Reg. U. S. Pat. Off.
Pat'd January 18, 1921, December 4, 1923



IDEAL ARCOFLASH BOILER

BURNS ALL FUELS

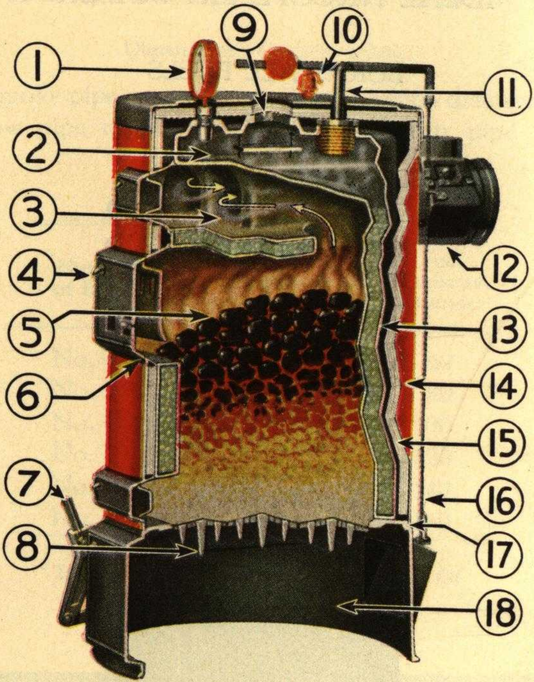


Patents Pending

THE Ideal Arcoflash Boiler is especially designed for 5 to 8 room homes, meeting the requirements of home owners who desire an attractive jacketed type of round boiler.

The red enameled metal jacket is lined with multi-ply improved asbestocel insulation. Steam and water boilers are completely equipped with automatic regulation and all accessories.

Tapped for Excelso Heater



IDEAL ARCOFLASH BOILERS

SPECIFICATIONS

1. Steam gauge and accessories supplied with steam boiler. Water boiler also completely equipped. (See page A162.)
2. Large steam dome and disengaging surface.
3. Long, double flue for hot gas travel secures high operating economy.
4. Substantial doors. Fire, clinker and cleanout doors equipped with special baffle linings.

SPECIFICATIONS—Continued

5. Large, scientifically proportioned fuel chamber of abundant coal-carrying capacity assures long firing periods.

6. All contact-surfaces of doors ground to smooth finish for dust-proof construction.

7. Shaking mechanism, easily operated, durable.

8. Special grates permit use of small size coal, such as buckwheat and pea. Triangular tops grind clinkers when grates are shaken. Reinforced trussed construction.

9. Flow tapping.

10. Relief valve.

11. Sensitive Arco Automatic Regulation.

12. Two-way smokehood with check and choke dampers.

13. One piece body casting. No assembling.

14. Indestructible two-piece steel jacket with baked enamel finish.

15. Improved type one-inch asbestocel insulation prevents excessive heat loss.

16. Rod with turn-buckle adjustment, connecting regulator and primary draft damper.

17. Base recess to provide precise jacket fitting.

18. Ashpit of ample size with cast iron base of strong, trussed construction.

Tapped for Excelso Water Heater.

IDEAL ARCOFLASH BOILERS—Performance Data—Steam and Water

Size of Boiler	Output in Equivalent Direct Radiation (Sq. Ft.)														
	Steam (240 B.t.u.)	**150**	**200**	**250**	**300**	**350**	**400**	**450**	**500**	**550**	**600**	**650**	**700**	**750**	**800**
	Water (150 B.t.u.)	**240**	**320**	**400**	**480**	**560**	**640**	**720**	**800**	**880**	**960**	**1040**	**1120**	**1200**	**1280**
	Output in (1000's) B.t.u. per Hr.	**36**	**48**	**60**	**72**	**84**	**96**	**108**	**120**	**132**	**144**	**156**	**168**	**180**	**192**
S-18 **W-18** Grate Area 1.77 Sq. Ft. Fuel Cap. 148 Lbs. Available Fuel 112 Lbs.	Time Available Fuel Will Last, Hrs.*	28.0	21.0	17.0	14.0	12.0	10.0	9.0	8.0	....	....	....	....	....	....
	Overall Efficiency of Boiler, %	72.8	72.3	72.0	71.5	70.8	69.5	68.5	67.0	....	....	....	....	....	....
	Stack Gas Temperature, °F.	360	415	470	530	585	640	700	760	....	....	....	....	....	....
	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	2.2	3.0	3.8	4.6	5.4	6.3	7.1	8.1	....	....	....	....	....	....
	Draft Required, Ins. of Water	.015	.025	.035	.045	.06	.075	.095	.14	....	....	....	....	....	....
	Chimney Size, Ins.	8x8	8x8	8x8	8x8	8x8	8x8	8x8	8x8	....	....	....	....	....	....
	Chimney Height, Ft.	30	30	30	30	30	30	30	30	....	....	....	....	....	....
S-20 **W-20** Grate Area 2.18 Sq. Ft. Fuel Cap. 180 Lbs. Available Fuel 135 Lbs.	Time Available Fuel Will Last, Hrs.*	...	25.5	20.5	17.0	14.5	12.5	11.0	9.5	8.5	8.0	....	....	....	....
	Overall Efficiency of Boiler, %	...	72.7	72.3	72.0	71.5	70.8	69.8	68.8	67.1	66.0	....	....	....	....
	Stack Gas Temperature, °F.	...	390	440	500	550	610	660	720	770	825	....	....	....	....
	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	...	2.4	2.7	3.6	4.3	5.0	5.7	6.4	7.2	8.0	....	....	....	....
	Draft Required, Ins. of Water	...	.02	.025	.035	.045	.06	.075	.09	.12	.15	....	....	....	....
	Chimney Size, Ins.	...	8x8	8x8	8x8	8x8	8x8	8x8	8x8	8x8	8x8	....	....	....	....
	Chimney Height, Ft.	...	30	30	30	30	30	30	30	30	30	....	....	....	....

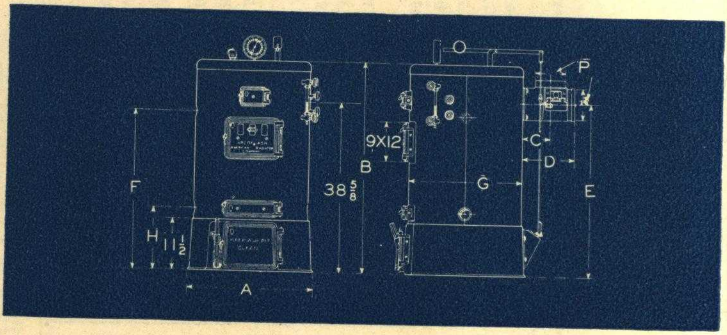
IDEAL ARCOFLASH BOILERS—Performance Data—Steam and Water

Size of Boiler	Output in Equivalent Direct Radiation (Sq. Ft.)														
	Steam (240 B.t.u.)	150	200	250	300	350	400	450	500	550	600	650	700	750	800
	Water (150 B.t.u.)	240	320	400	480	560	640	720	800	880	960	1040	1120	1200	1280
	Output in (1000's) B.t.u. per Hr.	36	48	60	72	84	96	108	120	132	144	156	168	180	192
S-22	Time Available Fuel Will Last, Hrs.*	...	...	24.5	20.5	17.0	15.0	13.0	12.0	10.5	9.5	8.5	8.0	....	....
W-22	Overall Efficiency of Boiler, %	...	...	72.5	72.2	71.7	71.2	70.5	69.7	68.5	67.5	66.0	65.0	....	....
Grate Area	Stack Gas Temperature, °F.	...	...	420	470	525	580	630	685	740	790	845	900	....	....
2.65 Sq. Ft.	Fuel Burned per Sq. Ft. of Grate per Hr.,														
Fuel Cap.	Lbs.	...	...	2.5	3.0	3.6	4.1	4.7	5.2	5.6	6.4	7.1	7.8	....	....
216 Lbs.	Draft Required, Ins. of Water	...	...	.02	.03	.04	.05	.06	.07	.085	.105	.13	.16	....	....
Available Fuel	Chimney Size, Ins.	...	...	8x8	8x8	8x8	8x8	8x8	8x8	8x8	8x8	8x8	8x8	....	....
162 Lbs.	Chimney Height, Ft.	...	...	35	35	35	35	35	35	35	35	35	35	....	....
S-24	Time Available Fuel Will Last, Hrs.*	...	...	...	25.0	21.0	18.0	16.0	14.0	13.0	11.5	10.5	9.5	8.5	8.0
W-24	Overall Efficiency of Boiler, %	...	...	...	72.8	72.2	71.9	71.2	70.5	69.9	69.0	67.8	66.0	64.5	63.0
Grate Area	Stack Gas Temperature, °F.	...	...	...	450	500	560	610	660	715	765	820	870	920	970
3.14 Sq. Ft.	Fuel Burned per Sq. Ft. of Grate per Hr.,														
Fuel Cap.	Lbs.	...	...	...	2.5	3.0	3.4	3.9	4.3	4.8	5.4	5.9	6.5	7.1	7.8
258 Lbs.	Draft Required, Ins. of Water	...	...	...	.025	.03	.04	.05	.06	.07	.085	.10	.12	.14	.17
Available Fuel	Chimney Size, Ins.	...	...	...	8x8	8x8	8x8	8x8	8x8	8x8	8x8	8x8	8x8	8x8	8x8
193 Lbs.	Chimney Height, Ft.	...	...	...	35	35	35	35	35	35	35	35	35	35	35

*Based on fuel of 12,500 B.t.u. per lb. For economical operation, add piping tax to Direct Radiation Load (Equivalent Direct Radiation); then select boiler from figures enclosed by heavy lines. For further explanation on boiler selection, see page A9. For guarantee, see page A7.

IDEAL ARCOFLASH BOILER

Dimensions—Outlets—Inlets



Size	A	B	C	D	E	F	G	H	P
S or W 18	26½	47½	6½	12	39¾	36	24	14	7
S or W 20	28½	47½	6½	12	39¾	36	26	14	7
S or W 22	31¼	49	7½	14½	40	35½	28¾	14½	9
S or W 24	33¼	49	7½	14½	40	35½	30¾	14½	9

STEAM

Number of Boiler	Outlets Number and Size	Inlets Number and Size	Chimney	
			Size, Inches	Height, Feet
S-18	1-3	2-2	8 x 8	30
S-20	1-3	2-2	8 x 8	30
S-22	1-4	2-3	8 x 8	35
S-24	1-4	2-3	8 x 8	35

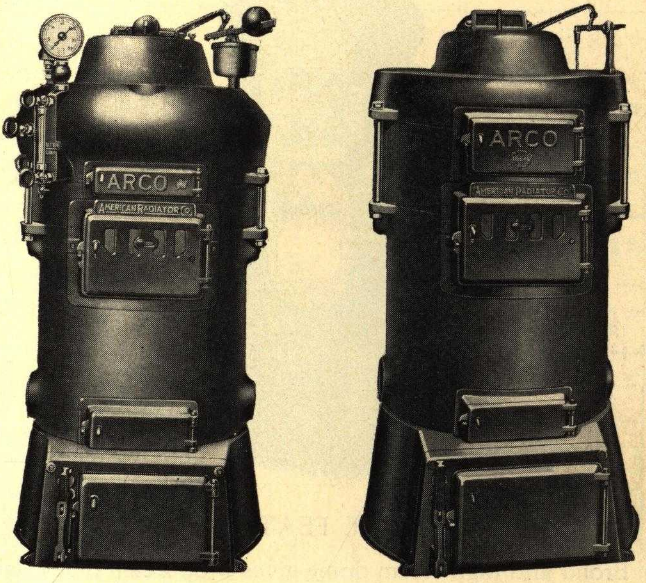
WATER

Number of Boiler	Outlets Number and Size	Inlets Number and Size	Chimney	
			Size, Inches	Height, Feet
W-18	1-3	2-2	8 x 8	30
W-20	1-3	2-2	8 x 8	30
W-22	1-4	2-3	8 x 8	35
W-24	1-4	2-3	8 x 8	35

IDEAL ARCO ROUND BOILER

The Standard Round Boiler of America for a Generation

Burns Hard or Soft Coal, Coke, Oil or Gas



Steam

Water

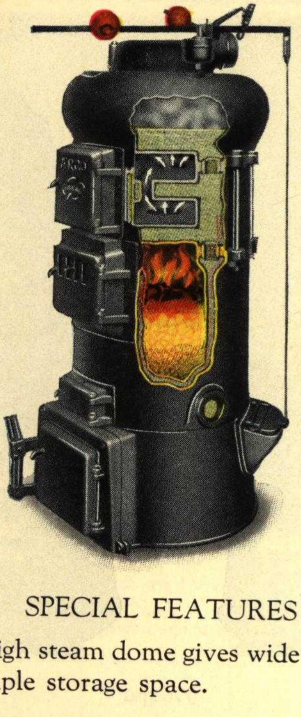
(Patented)

MANY years of satisfactory service in hundreds of thousands of installations has earned for the Ideal Arco Round Boiler its outstanding reputation as the most popular round boiler in America.

To the owner it means quick heat generation, absolutely dependable lifetime service, and a high degree of operating economy with a minimum of care.

Tapped for Excelso Heater

IDEAL ARCO ROUND BOILER



SPECIAL FEATURES

(1) Broad and high steam dome gives wide steam disengaging area and ample storage space.

(2) Grate area, direct heating surface, flue area and gas travel designed for quick heating and good fuel economy.

(3) Fire pot made with Third Nipple construction.

(4) Machined contact faces of doors and dampers give tight, leak-proof construction.

(5) Doors, frames, hinge pins of extra substantial construction.

(6) Convenient Rear Draft Control.

Number of Boiler	Output in Equivalent Direct Radiation (Sq. Ft.) Steam (240 B.t.u.) Water (150 B.t.u.)	100 160	150 240	200 320	250 400	300 480	350 560	400 640	450 720	500 800	550 880	600 960
	Output in (1000's) B.t.u. per Hr.	24	36	48	60	72	84	96	108	120	132	144
S-1704	Time Available Fuel Will Last, Hrs.*	34.8	24.1	18.1	14.3	11.6	9.6	8.0	.....	.....	.....	.....
W-1704	Overall Efficiency of Boiler, %	62.5	64.8	65	64	62.5	60.5	58.3	.....	.....	.....	.....
Grate Area	Stack Gas Temperature, °F	310	358	400	450	495	540	590	.....	.....	.....	.....
1.4 Sq. Ft. Fuel Cap.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	2.2	3.2	4.2	5.3	6.6	8.0	9.4	.....	.....	.....	.....
142 Lbs.	Draft Required, Ins. of Water	.02	.025	.035	.045	.055	.075	0.10	.....	.....	.....	.....
Available Fuel	Chimney Size, Ins	8x8	8x8	8x8	8x8	8x8	8x8	8x8	.....	.....	.....	.....
107 Lbs.	Chimney Height, Ft	30	30	30	30	30	30	30	.....	.....	.....	.....
S-1705	Time Available Fuel Will Last, Hrs.*	.....	25.2	18.9	15.1	12.4	10.3	8.9	7.6	.....	.....	.....
W-1705	Overall Efficiency of Boiler, %	.....	68	68	67.5	66.5	65	63.5	61.3	.....	.....	.....
Grate Area	Stack Gas Temperature, °F	.....	320	360	400	440	480	520	560	.....	.....	.....
1.4 Sq. Ft. Fuel Cap.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	.....	3.0	4.0	5.1	6.2	7.4	8.6	10.1	.....	.....	.....
142 Lbs.	Draft Required, Ins. of Water	.....	.025	.035	.047	.06	.07	.085	0.10	.....	.....	.....
Available Fuel	Chimney Size, Ins	.....	8x8	8x8	8x8	8x8	8x8	8x8	8x8	.....	.....	.....
107 Lbs.	Chimney Height, Ft	.....	30	30	30	30	30	30	30	.....	.....	.....
S-1706	Time Available Fuel Will Last, Hrs.*	.....	26.4	19.6	15.6	12.9	10.9	9.4	8.2	.....	.....	.....
W-1706	Overall Efficiency of Boiler, %	.....	71	70.5	70	69.3	68.5	67.2	66	.....	.....	.....
Grate Area	Stack Gas Temperature, °F	.....	300	330	360	390	420	450	480	.....	.....	.....
1.4 Sq. Ft. Fuel Cap.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	.....	2.9	3.9	4.9	5.9	7.0	8.1	9.3	.....	.....	.....
142 Lbs.	Draft Required, Ins. of Water	.....	.03	.033	.04	.045	.05	.06	.075	.....	.....	.....
Available Fuel	Chimney Size, Ins	.....	8x8	8x8	8x8	8x8	8x8	8x8	8x8	.....	.....	.....
107 Lbs.	Chimney Height, Ft.	.....	35	35	35	35	35	35	35	.....	.....	.....

*Based on fuel of 12,500 B.t.u. per lb. For economical operation, add piping tax to Direct Radiation Load (Equivalent Direct Radiation); then select boiler from figures enclosed by heavy lines. For further explanation on boiler selection, see page A9. For guarantee see page A7.

19-INCH IDEAL ARCO ROUND BOILER—Performance Data—Steam and Water

Number of Boiler	Output in Equivalent Direct Radiation (Sq. Ft.)											
	Steam (240 B.t.u.)	100	150	200	250	300	350	400	450	500	550	600
	Water (150 B.t.u.)	160	240	320	400	480	560	640	720	800	880	960
	Output in (1000's) B.t.u. per Hr.	24	36	48	60	72	84	96	108	120	132	144
S-1904	Time Available Fuel Will Last, Hrs.*	.....	26.2	20	16	13.1	11.1	9.6	8.3	7.3	.....	.....
W-1904	Overall Efficiency of Boiler, %	.....	58	58.8	58.8	58	57.5	56.6	55.5	54	.....	.....
Grate Area	Stack Gas Temperature, °F.	.....	370	430	450	550	610	670	730	790	.....	.....
1.88 Sq. Ft.	Fuel Burned per Sq. Ft. of Grate per Hr.,											
Fuel Cap.	Lbs.	.....	2.6	3.4	4.3	5.3	6.2	7.2	8.3	9.5	.....	.....
173 Lbs.	Draft Required, Ins. of Water	.....	.025	.032	.04	.05	.065	.08	.10	.12	.....	.....
Available Fuel	Chimney Size, Ins.	.....	8x8	8x8	8x8	8x8	8x8	8x8	8x8	8x8	.....	.....
130 Lbs.	Chimney Height, Ft.	.....	30	30	30	30	30	30	30	30	.....	.....
S-1905	Time Available Fuel Will Last, Hrs.*	.....	.....	22	17.6	14.7	12.5	10.8	9.5	8.4	7.5	.....
W-1905	Overall Efficiency of Boiler, %	.....	.....	65	65.1	65	64.8	64	63	62	60.8	.....
Grate Area	Stack Gas Temperature, °F.	.....	.....	370	420	460	500	540	585	630	670	.....
1.88 Sq. Ft.	Fuel Burned per Sq. Ft. of Grate per Hr.,											
Fuel Cap.	Lbs.	.....	.....	3.1	3.9	4.7	5.5	6.4	7.3	8.2	9.2	.....
173 Lbs.	Draft Required, Ins. of Water	.....	.....	.02	.025	.03	.04	.05	.06	.07	.085	.....
Available Fuel	Chimney Size, Ins.	.....	.....	8x8	8x8	8x8	8x8	8x8	8x8	8x8	8x8	.....
130 Lbs.	Chimney Height, Ft.	.....	.....	35	35	35	35	35	35	35	35	.....
S-1906	Time Available Fuel Will Last, Hrs.*	.....	.....	22.4	18.2	15.3	13.0	11.5	10.1	9.1	8.2	7.5
W-1906	Overall Efficiency of Boiler, %	.....	.....	66	67	67.5	67.5	67.5	67.5	67.2	67	66.5
Grate Area	Stack Gas Temperature, °F.	.....	.....	280	320	360	400	440	490	530	570	610
1.88 Sq. Ft.	Fuel Burned per Sq. Ft. of Grate per Hr.,											
Fuel Cap.	Lbs.	.....	.....	3.1	3.8	4.5	5.3	6.0	6.8	7.6	8.4	9.2
173 Lbs.	Draft Required, Ins. of Water	.....	.....	.025	.045	.065	.09	.11	.14	.16	.189	.22
Available Fuel	Chimney Size, Ins.	.....	.....	8x8	8x8	8x8	8x8	8x8	8x8	8x8	8x8	8x8
130 Lbs.	Chimney Height, Ft.	.....	.....	35	35	35	35	35	35	35	35	35

20-INCH IDEAL ARCO ROUND BOILER—Performance Data—Steam and Water

Number of Boiler	Output in Equivalent Direct Radiation (Sq. Ft.) Steam (240 B.t.u.) Water (150 B.t.u.)	200 320	250 400	300 480	350 560	400 640	450 720	500 800	550 880	600 960	650 1040	700 1120	750 1200	800 1280	850 1360	900 1440
	Output in (1000's) B.t.u. per Hr.	48	60	72	84	96	108	120	132	144	156	168	180	192	204	216
S-2004	Time Available Fuel Will Last, Hrs.*	25.8	20.5	16.9	14.3	12.3	10.8	9.5	8.4	7.6	6.9	...	...	...	...	...
W-2004	Overall Efficiency of Boiler, %	63.5	63.0	62.5	61.5	60.5	59.5	58.5	57.2	56.0	54.8	...	...	...	...	...
Grate Area	Stack Gas Temperature, °F	420	480	540	590	650	700	760	820	880	940	...	...	...	...	...
2.23 Sq. Ft. Fuel Cap.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	2.7	3.4	4.1	4.9	5.7	6.5	7.4	8.3	9.2	10.1	...	...	...	...	...
208 Lbs.	Draft Required, Ins. of Water	.03	.04	.045	.05	.06	.07	.08	.095	.11	.13	...	...	...	...	...
Available Fuel	Chimney Size, Ins.	8x8	8x8	8x8	8x8	8x8	8x8	8x8	8x8	8x8	8x8	...	...	...	...	...
156 Lbs.	Chimney Height, Ft.	30	30	30	30	30	30	30	30	30	30	...	...	...	...	...
S-2005	Time Available Fuel Will Last, Hrs.*	27.6	22.1	18.3	15.5	13.5	11.9	10.5	9.5	8.5	7.8	7.1	...	...	...	...
W-2005	Overall Efficiency of Boiler, %	68.0	67.8	67.5	67.0	66.5	65.8	65.0	64.1	63.2	62.2	61.0	...	...	...	...
Grate Area	Stack Gas Temperature, °F	310	350	390	420	460	500	540	580	620	660	700	...	...	...	...
2.23 Sq. Ft. Fuel Cap.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	2.5	3.2	3.8	4.5	5.2	5.9	6.7	7.4	8.2	9.0	9.9	...	...	...	...
208 Lbs.	Draft Required, Ins. of Water	.025	.03	.04	.045	.05	.06	.07	.08	.09	.10	.12	...	...	...	...
Available Fuel	Chimney Size, Ins.	8x8	8x8	8x8	8x8	8x8	8x8	8x8	8x8	8x8	8x8	8x8	...	...	...	...
156 Lbs.	Chimney Height, Ft.	35	35	35	35	35	35	35	35	35	35	35	...	...	...	...
S-2006	Time Available Fuel Will Last, Hrs.*	27.8	22.3	18.5	15.8	13.7	12.1	10.8	9.8	8.8	8.1	7.4	7.3	...	...	...
W-2006	Overall Efficiency of Boiler, %	68.5	68.5	68.2	68.0	67.5	67.0	66.5	66.0	65.0	64.5	63.5	62.5	...	...	...
Grate Area	Stack Gas Temperature, °F	280	320	350	380	420	450	480	520	550	580	620	650	...	...	...
2.23 Sq. Ft. Fuel Cap.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	2.5	3.1	3.8	4.4	5.1	5.8	6.5	7.1	8.0	8.6	9.5	9.6	...	...	...
208 Lbs.	Draft Required, Ins. of Water	.01	.02	.028	.035	.04	.05	.06	.07	.08	.09	.10	.11	...	...	...
Available Fuel	Chimney Size, Ins.	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	...	...	...
156 Lbs.	Chimney Height, Ft.	35	35	35	35	35	35	35	35	35	35	35	35	...	...	...

*Based on fuel of 12,500 B.t.u. per lb. For economical operation, add piping tax to Direct Radiation Load (Equivalent Direct Radiation); then select boiler from figures enclosed by heavy lines. For further explanation on boiler selection, see page A9. For guarantee, see page A7.

22-INCH IDEAL ARCO ROUND BOILER—Performance Data—Steam and Water

Number of Boiler	Output in Equivalent Direct Radiation (Sq. Ft.) Steam (240 B.t.u.) Water (150 B.t.u.)	200 320	250 400	300 480	350 560	400 640	450 720	500 800	550 880	600 960	650 1040	700 1120	750 1200	800 1280	850 1360	900 1440
	Output in (1000's) B.t.u. per Hr.	48	60	72	84	96	108	120	132	144	156	168	180	192	204	216
S-2204	Time Available Fuel Will Last, Hrs.*	...	27.8	23.2	19.6	17.0	15.0	13.3	11.9	10.6	9.6	8.7	8.0	7.3	...	...
W-2204	Overall Efficiency of Boiler, %	...	63.0	62.9	62.2	61.5	61.0	60.0	59.0	57.5	56.5	55.2	54.0	52.8	...	...
Grate Area	Stack Gas Temperature, °F.	...	430	480	520	570	620	660	700	750	800	840	890	940	...	...
2.62 Sq. Ft. Fuel Cap.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	...	2.9	3.5	4.1	4.8	5.4	6.1	6.8	7.6	8.4	9.3	10.1	11.1	...	...
282 Lbs.	Draft Required, Ins. of Water	...	.02	.025	.03	.035	.04	.05	.06	.07	.08	.09	.11	.125	...	...
Available Fuel	Chimney Size, Ins.	...	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	...	...
212 Lbs.	Chimney Height, Ft.	...	35	35	35	35	35	35	35	35	35	35	35	35	...	...
S-2205	Time Available Fuel Will Last, Hrs.*	...	28.5	24	20.6	18	16	14.3	12.9	11.6	10.6	9.7	8.9	8.2	7.5	...
W-2205	Overall Efficiency of Boiler, %	...	64.5	65	65.3	65.2	65	64.5	64	63.2	62.5	61.5	60.5	59.2	58	...
Grate Area	Stack Gas Temperature, °F.	...	390	420	450	480	510	540	570	600	630	660	690	720	750	...
2.62 Sq. Ft. Fuel Cap.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	...	2.8	3.4	3.9	4.5	5.1	5.7	6.3	7.0	7.6	8.4	9.1	9.9	10.8	...
282 Lbs.	Draft Required, Ins. of Water	...	.02	.025	.03	.035	.04	.05	.055	.062	.07	.08	.09	.10	.11	...
Available Fuel	Chimney Size, Ins.	...	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	...
212 Lbs.	Chimney Height, Ft.	...	35	35	35	35	35	35	35	35	35	35	35	35	35	...
S-2206	Time Available Fuel Will Last, Hrs.*	...	...	24.7	21.2	18.6	16.6	14.8	13.5	12.3	11.2	10.3	9.5	8.8	8.1	7.5
W-2206	Overall Efficiency of Boiler, %	...	...	67	67.2	67.5	67.5	67.2	67	66.5	66	65.2	64.5	63.5	62.2	61
Grate Area	Stack Gas Temperature, °F.	...	...	360	380	410	430	460	490	510	540	560	590	620	640	670
2.62 Sq. Ft. Fuel Cap.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	...	...	3.3	3.8	4.3	4.9	5.5	6.0	6.6	7.2	7.9	8.5	9.2	10	10.8
282 Lbs.	Draft Required, Ins. of Water	...	...	.025	.03	.035	.04	.047	.053	.06	.066	.075	.085	.095	.106	.12
Available Fuel	Chimney Size, Ins.	...	...	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12
212 Lbs.	Chimney Height, Ft.	...	...	40	40	40	40	40	40	40	40	40	40	40	40	40

25-INCH IDEAL ARCO ROUND BOILER—Performance Data—Steam and Water

Number of Boiler	Output in Equivalent Direct Radiation (Sq. Ft.) Steam (240 B.t.u.) Water (150 B.t.u.)	300 480	350 560	400 640	450 720	500 800	550 880	600 960	650 1040	700 1120	750 1200	800 1280	850 1360	900 1440	950 1520	1025 1640	1100 1760	1200 1920	1300 2080	1400 2240
	Output in (1000's) B.t.u. per Hr.	72	84	96	108	120	132	144	156	168	180	192	204	216	228	246	264	288	312	336
S-2504 **W-2504**	Time Available Fuel Will Last, Hrs.*	26.9	22.9	19.8	17.6	15.6	14.1	12.8	11.6	10.6	9.8	9.1	8.4	7.8	7.2	...	...	...	...	...
Grate Area 3.53 Sq. Ft.	Overall Efficiency of Boiler, %	61	60.6	60	59.9	59	58.5	57.8	57	56	55.5	55	54	53	52	...	...	...	...	...
	Stack Gas Temperature, °F.	470	510	560	600	640	680	730	770	820	860	900	950	990	1030	...	...	...	...	...
Fuel Cap. 338 Lbs.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	2.7	3.1	3.6	4.1	4.6	5.1	5.7	6.2	6.8	7.3	7.9	8.6	9.2	10	...	...	...	...	...
	Draft Required, Ins. of Water	.03	.038	.04	.05	.055	.06	.07	.075	.085	.09	.10	.11	.117	.128	...	...	...	...	...
Available Fuel 254 Lbs.	Chimney Size, Ins.	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	...	...	...	...	...
	Chimney Height, Ft.	35	35	35	35	35	35	35	35	35	35	35	35	35	35	...	...	...	...	...
S-2505 **W-2505**	Time Available Fuel Will Last, Hrs.*	29.6	25.3	22.1	19.5	17.5	15.9	14.4	13.2	12.2	11.3	10.4	9.7	9.1	8.5	7.7	...	...	...	...
Grate Area 3.53 Sq. Ft.	Overall Efficiency of Boiler, %	67	67	66.8	66.5	66.1	66	65.2	65	64.5	64	63.1	62.5	62	61	60	...	...	...	...
	Stack Gas Temperature, °F.	370	400	420	450	480	510	530	560	590	620	650	680	710	740	780	...	...	...	...
Fuel Cap. 338 Lbs.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	2.4	2.8	3.3	3.7	4.1	4.6	5.0	5.4	5.9	6.4	6.9	7.4	7.9	8.5	9.3	...	...	...	...
	Draft Required, Ins. of Water	.024	.029	.03	.038	.04	.05	.055	.06	.065	.072	.08	.086	.095	.105	.12	...	...	...	...
Available Fuel 254 Lbs.	Chimney Size, Ins.	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	...	...	...	...
	Chimney Height, Ft.	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	...	...	...	...
S-2506 **W-2506**	Time Available Fuel Will Last, Hrs.*	30.4	26.1	22.8	20.3	18.2	16.5	15	13.8	12.7	11.8	10.9	10.2	9.5	9	8.2	7.5	...	...	...
Grate Area 3.53 Sq. Ft.	Overall Efficiency of Boiler, %	69	69	69	69	68.8	68.5	68	67.8	67.2	66.8	66	65.5	65	64.5	63.5	62.5	...	...	...
	Stack Gas Temperature, °F.	340	360	380	400	430	450	470	500	520	540	560	590	610	630	670	700	...	...	...
Fuel Cap. 338 Lbs.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	2.4	2.8	3.2	3.5	4.0	4.4	4.8	5.2	5.7	6.1	6.6	7.1	7.6	8.0	8.8	9.6	...	...	...
	Draft Required, Ins. of Water	.02	.025	.03	.035	.04	.045	.05	.055	.06	.065	.07	.08	.085	.09	.103	.115	...	...	...
Available Fuel 254 Lbs.	Chimney Size, Ins.	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	...	...	...
	Chimney Height, Ft.	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	...	...	...

*Based on fuel of 12,500 B.t.u. per lb. For economical operation, add piping tax to Direct Radiation Load (Equivalent Direct Radiation); then select boiler from figures enclosed by heavy lines. For further explanation on boiler selection, see page A9. For guarantee, see page A7.

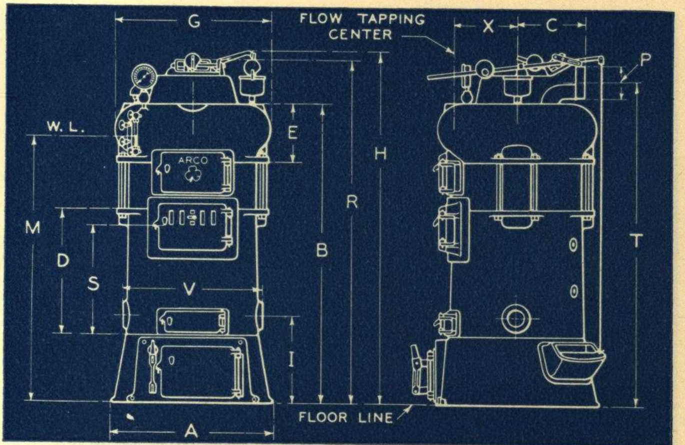
28-INCH IDEAL ARCO ROUND BOILER—Performance Data—Steam and Water

Number of Boiler	Output in Equivalent Direct Radiation (Sq. Ft.) Steam (240 B.t.u.) Water (150 B.t.u.)	300 480	350 560	400 640	450 720	500 800	550 880	600 960	650 1040	700 1120	750 1200	800 1280	850 1360	900 1440	950 1520	1025 1640	1100 1760	1200 1920	1300 2080	1400 2240
	Output in (1000's) B.t.u. per Hr.	72	84	96	108	120	132	144	156	168	180	192	204	216	228	246	264	288	312	336
S-2804 **W-2804** Grate Area 4.36 Sq. Ft. Fuel Cap. 496 Lbs. Available Fuel 372 Lbs.	Time Available Fuel Will Last, Hrs.*	..	36.5	31.7	27.9	24.8	22.3	20.3	18.5	16.9	15.5	14.4	13.3	12.4	11.5	10.4	9.4	8.2	...	...
	Overall Efficiency of Boiler, %	..	66	65.5	64.8	64	63.5	62.8	62	61.1	60.2	59.5	58.5	57.5	56.5	55	53.5	51	...	...
	Stack Gas Temperature, °F	..	460	490	520	560	590	620	650	680	720	750	780	820	850	890	940	1010	...	...
	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	..	2.3	2.7	3.1	3.4	3.8	4.2	4.6	5.1	5.5	5.9	6.4	6.9	7.4	8.2	9.1	10.4	...	...
	Draft Required, Ins. of Water	..	.018	.02	.025	.028	.03	.035	.04	.045	.05	.055	.06	.07	.075	.085	.10	.12	...	...
	Chimney Size, Ins.	..	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	...	...
	Chimney Height, Ft.	..	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	...	...
S-2805 **W-2805** Grate Area 4.36 Sq. Ft. Fuel Cap. 496 Lbs. Available Fuel 372 Lbs.	Time Available Fuel Will Last, Hrs.*	..	..	32	28.3	25.4	23.1	21.1	19.3	17.8	16.5	15.4	14.4	13.4	12.6	11.5	10.5	9.5	8.5	...
	Overall Efficiency of Boiler, %	..	..	66.2	65.9	65.6	65.5	65.2	64.8	64.4	63.9	63.6	63	62.4	61.7	60.6	59.9	58.9	57	...
	Stack Gas Temperature, °F	..	..	430	450	480	500	520	540	570	590	620	640	660	690	720	760	800	850	...
	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	..	..	2.7	3.0	3.4	3.7	4.1	4.4	4.8	5.2	5.5	5.9	6.4	6.8	7.4	8.1	9.0	10	...
	Draft Required, Ins. of Water	..	..	.015	.018	.02	.025	.03	.035	.04	.045	.05	.055	.06	.068	.078	.09	.11	.13	...
	Chimney Size, Ins.	..	..	12x12	12x12	12x12	12x12	12x12	12x12	12x12	12x12	12x12	12x12	12x12	12x12	12x12	12x12	12x12	12x12	...
	Chimney Height, Ft.	..	..	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	...
S-2806 **W-2806** Grate Area 4.36 Sq. Ft. Fuel Cap. 496 Lbs. Available Fuel 372 Lbs.	Time Available Fuel Will Last, Hrs.*	..	..	32.2	28.5	25.6	23.3	21.3	19.6	18.1	16.8	15.7	14.7	13.8	12.9	11.8	10.9	9.9	8.9	8.2
	Overall Efficiency of Boiler, %	..	..	66.5	66.3	66.2	66.2	66	65.8	65.5	65.2	65	64.5	64	63.5	62.5	62.1	61.5	60	59
	Stack Gas Temperature, °F	..	..	310	330	350	370	390	410	430	450	470	490	500	520	550	580	620	670	710
	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	..	..	2.7	3.0	3.3	3.7	4.0	4.4	4.7	5.1	5.4	5.8	6.2	6.6	7.2	7.8	8.6	9.6	10.4
	Draft Required, Ins. of Water	..	..	.025	.028	.03	.032	.035	.038	.04	.043	.045	.05	.055	.06	.065	.075	.09	.11	.13
	Chimney Size, Ins.	..	..	12x12	12x12	12x12	12x12	12x12	12x12	12x12	12x12	12x12	12x12	12x12	12x12	12x12	12x12	12x12	12x12	12x12
	Chimney Height, Ft.	..	..	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45

*Based on fuel of 12,500 B.t.u. per lb. For economical operation, add piping tax to Direct Radiation Load (Equivalent Direct Radiation); then select boiler from figures enclosed by heavy lines. For further explanation on boiler selection, see page A9. For guarantee, see page A7.

Ideal Arco Round Boiler—Steam

Dimensions—Outlets—Inlets

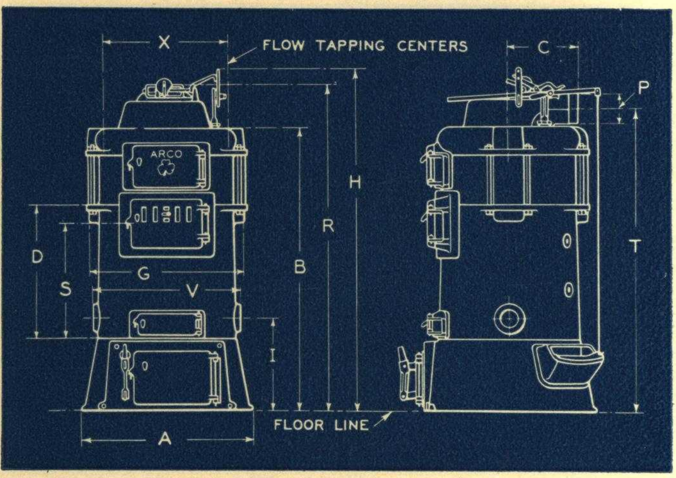


Number of Boiler	Size of Outlets and Inlets*	Dimensions in Inches													
		A	B	C	D	E	G	H	I	M	P	R	S	T	V
S-1704	2½″	24¾	53¼	11¼	24¾	11	24¼	64	16½	47	8	60¼	21½	57	21¾
S-1705	2½″	24¾	57¾	11¼	24¾	11	24¼	68½	16½	51	8	64¾	21½	61½	21¾
S-1706	2½″	24¾	62¼	11¼	24¾	11	24¼	73	16½	56	8	69¼	21½	66⅛	21¾
S-1904	2½″	27¼	52½	11¼	23½	11½	26¾	63½	16¼	45	8	59½	20½	56	24¼
S-1905	2½″	27¼	57	11¼	23½	11½	26¾	68	16¼	50	8	64	20½	60½	24¼
S-1906	2½″	27¼	61¾	11¼	23½	11½	26¾	72¾	16¼	55	8	68¾	20½	65¼	24¼
S-2004	3″	29	51½	11¼	23½	11¼	28½	62½	16⅛	46	8	58¼	20½	54⅞	25½
S-2005	3″	29	56¼	11¼	23½	11¼	28½	67¼	16⅛	51	8	63	20½	59½	25½
S-2006	3″	29	60¾	11¼	23½	11¼	28½	71¾	16⅛	55	8	67½	20½	64⅛	25½
S-2204	3″	30	54	13¼	24½	11½	30½	65¾	16⅞	47	9	62¼	21¼	58⅛	27¾
S-2205	3″	30	58½	13¼	24½	11½	30½	70¼	17⅞	52	9	66¾	21¼	62½	27¾
S-2206	3″	30	63¼	13¼	24½	11½	30½	75	16⅞	56	9	71½	21¼	67⅜	27¾
S-2504	3½″	33¼	55¾	13¼	25¼	12½	33¼	68	17	48	9	63½	22	59½	30½
S-2505	3½″	33¼	60½	13¼	25¼	12½	33¼	72¾	17	53	9	68¼	22	64¼	30½
S-2506	3½″	33¼	65½	13¼	25¼	12½	33¼	77¾	17	58	9	73¼	22	69¼	30½
S-2804	4″	36¾	57¾	14½	26¼	13¼	37	69¾	17⅛	49	10	66½	23¼	62¼	34¼
S-2805	4″	36¾	62¾	14½	26¼	13¼	37	74¾	17⅛	54	10	71½	23¼	67¼	34¼
S-2806	4″	36¾	68	14½	26¼	13¼	37	80	17⅛	59	10	76¾	23¼	72⅜	34¼

* Steam boilers have one outlet and two inlets.

Ideal Arco Round Boiler—Water

Dimensions—Outlets—Inlets

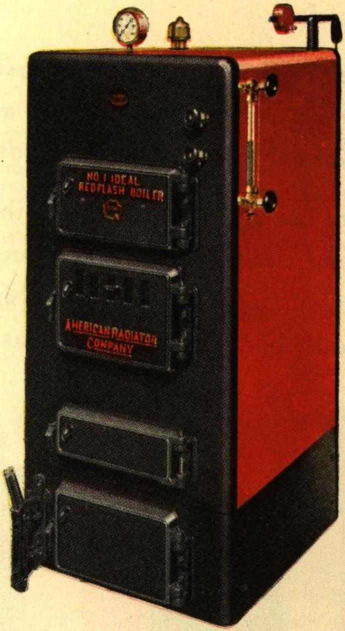


Number of Boiler	Size of Outlets and Inlets*	Dimensions in Inches												
		A	B	C	D	G	H	I	P	R	S	T	V	X
W-1704	2½″	24¾	47¼	11¼	24¾	24	58	16½	8	54½	21½	51¼	21¾	18¼
W-1705	2½″	24¾	51¾	11¼	24¾	24	62½	16¼	8	59	21½	55¾	21¾	18¼
W-1706	2½″	24¾	56¼	11¼	24¾	24	67	16½	8	63½	21½	60¼	21¾	18¼
W-1904	2½″	27¼	46	11¼	23½	25	57	16¼	8	52½	20½	49¼	24¼	19¼
W-1905	2½″	27¼	50½	11¼	23½	25	61½	16¼	8	57	20½	53¾	24¼	19¼
W-1906	2½″	27¼	55	11¼	23½	25	66	16¼	8	61½	20½	58¼	24¼	19¼
W-2004	3″	29	45½	11¼	23½	27	56½	16⅛	8	52	20½	48½	25½	21
W-2005	3″	29	50¼	11¼	23½	27	61½	16⅛	8	56¾	20½	53¼	25½	21
W-2006	3″	29	54¾	11¼	23½	27	65¾	16⅛	8	61¼	20½	57¾	25½	21
W-2204	3″	30	47¾	13¼	24½	29½	59	16⅞	9	55½	21¼	51½	27¾	23
W-2205	3″	30	52	13¼	24½	29½	63¼	16⅞	9	59¾	21¼	55¾	27¾	23
W-2206	3″	30	57	13¼	24½	29½	68¼	16⅞	9	64¾	21¼	60¾	27¾	23
W-2504	3½″	33¼	48¾	13¼	25¼	33	60	17	9	56½	22	52⅝	30½	25½
W-2505	3½″	33¼	53½	13¼	25¼	33	64¾	17	9	61¼	22	57⅜	30½	25½
W-2506	3½″	33¼	58¾	13¼	25¼	33	70	17	9	66½	22	62⅝	30½	25½
W-2804	4″	36¾	50¾	14½	26¼	37	63	17⅛	10	59½	23¼	55	34¼	29½
W-2805	4″	36¾	55¾	14½	26¼	37	68	17⅛	10	64½	23¼	60	34¼	29½
W-2806	4″	36¾	61	14½	26¼	37	73¼	17⅛	10	69¾	23¼	65¼	34¼	29½

* Water boilers have two outlets and two inlets.

IDEAL REDFLASH BOILER

ANTHRACITE



Patent Pending

THE Ideal Redflash Boiler is a completely equipped, sectional, jacketed boiler, in sizes to fit a large range of homes and other buildings. In it are incorporated the scientific principles of design which have been developed during our forty years of manufacturing experience and research.

This was the first completely equipped, jacketed, insulated boiler offered at popular prices. And so novel and distinctive was its appeal that it won immediate and universal popularity. Almost over night it revolutionized the design of heating boilers in general.

The Redflash Boiler is enclosed in an indestructible enameled steel jacket which permanently protects a multi-ply lining of improved asbestocel insulation.

The polished baked-enamel surface of the jacket makes it as easy to dust and clean as any piece of furniture in the home. All contacting surfaces have been machined to fit perfectly, making the boiler both dust-proof and gas-proof.

No. 1 Series

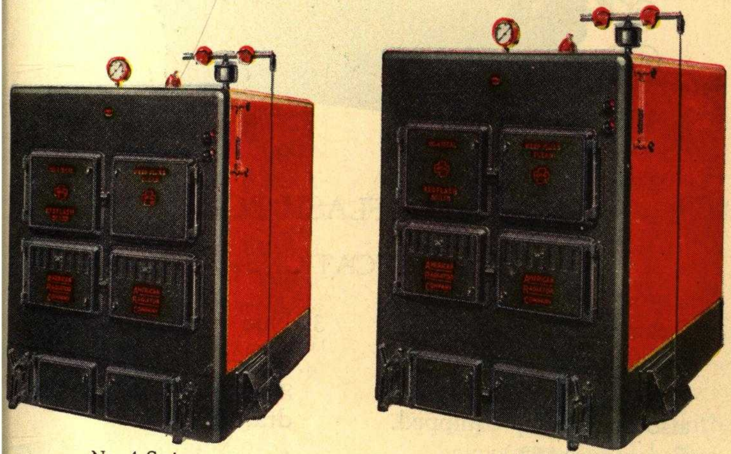
No. 2 Series

No. 3 Series

The cleanliness, compactness, and attractiveness of the Ideal Redflash Boiler have made possible the conversion of the old cellar into useful, livable space, and in a large measure have been the inspiration for the modern basement movement now so popular.

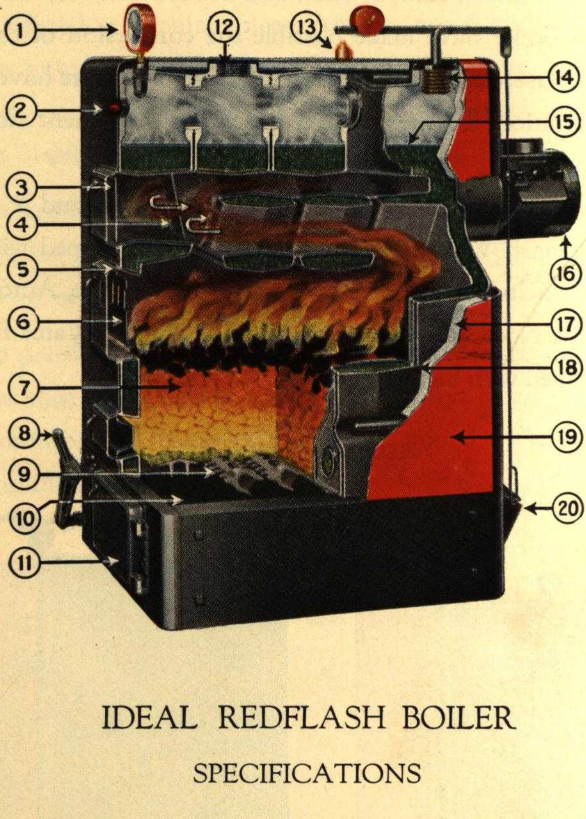
All Ideal Redflash Steam Boilers and Nos. 1 and 2 Series Ideal Redflash Water Boilers are completely equipped with accessories including the sensitive and reliable Arco Automatic Regulator. Nos. 3, 4 and 5 Series Ideal Redflash Water Boilers are equipped with hand regulation.

Tapped for Excelso Heater



No. 4 Series

No. 5 Series



IDEAL REDFLASH BOILER

SPECIFICATIONS

1. Steam gauge and all other accessories provided with steam boiler. Water boiler also completely equipped. (See page A162.)
2. Blow-off tapping for cleaning, conveniently located in front.
3. Flue door with curved baffle lining, insures easy gas travel with minimum draft.
4. Long, double-gallery flue for hot gas travel secures high operating economy.

THE IDEAL FITTER

SPECIFICATIONS—Continued

5. All contacting surfaces of doors and sections are machine ground, giving gas and dust-proof construction.

6. Sturdy fire door with special baffle lining containing secondary air distributor.

7. Large, scientifically proportioned fuel chamber of abundant coal-carrying capacity for long firing periods and easy caretaking.

8. Shaking mechanism, easily operated, durable.

9. Grates permit use of small size coal. Special grates for burning buckwheat are obtainable on special order for Nos. 3, 4 and 5 Series. Triangular top grate construction grinds clinkers when grates are shaken, facilitating caretaking.

0. Ashpit of ample proportions for easy caretaking and safeguarding of grates.

11. Note the substantial doors and plate fittings.

12. Flow tapping.

13. Relief valve.

14. Sensitive Arco Automatic Regulation. (See page A37).

15. Large steam dome and disengaging surface.

16. Two - way smokehood with check and choke dampers.

17. Improved type one-inch asbestocel insulation prevents radiant heat loss. Permanently protected by an indestructible steel jacket.

18. New, sealed, seepage-proof construction between sections.

19. Sheet steel jacket with baked enamel finish. Easily cleaned and dusted.

20. Primary draft damper.

NO. 1 IDEAL REDFLASH BOILER—Performance Data—Steam and Water

Number of Boiler	Output in Equivalent Direct Radiation (Sq. ft.)														
	Steam (240 B.t.u.)	125	200	275	350	425	500	575	650	725	800	875	950	1025	1100
	Water (150 B.t.u.)	200	320	440	560	680	800	920	1040	1160	1280	1400	1520	1640	1760
	Output in (1000's) B.t.u. per Hr.	30	48	66	84	102	120	138	156	174	192	210	228	246	264
1-S-4	Time Available Fuel Will Last, Hrs.*	24.3	15.1	11.0	8.5	....	....	....	....	....	....	....	....	....	....
1-W-4	Overall Efficiency of Boiler, %	64.7	64.6	64.4	64.0	....	....	....	....	....	....	....	....	....	....
Grate Area	Stack Gas Temperature, °F	410	480	530	620	....	....	....	....	....	....	....	....	....	....
1.33 Sq. Ft.	Fuel Burned per Sq. Ft. of Grate														
Fuel Cap.	per Hr., Lbs.	2.8	4.5	6.2	8.0	....	....	....	....	....	....	....	....	....	....
120 lbs.	Draft Required, Ins. of Water	.031	.037	.050	.070	....	....	....	....	....	....	....	....	....	....
Available Fuel	Chimney Size, Ins.	8x8	8x8	8x8	8x8	....	....	....	....	....	....	....	....	....	....
90 Lbs.	Chimney Height, Ft.	30	30	30	30	....	....	....	....	....	....	....	....	....	....
1-S-5	Time Available Fuel Will Last, Hrs.*	...	20.6	15.0	11.7	9.6	8.1	....	....	....	....	....	....	....	....
1-W-5	Overall Efficiency of Boiler, %	...	66.1	65.8	65.5	65.3	64.6	....	....	....	....	....	....	....	....
Grate Area	Stack Gas Temperature, °F	...	460	520	580	640	700	....	....	....	....	....	....	....	....
1.79 Sq. Ft.	Fuel Burned per Sq. Ft. of Grate														
Fuel Cap.	per Hr., Lbs.	...	3.3	4.5	5.7	7.0	8.3	....	....	....	....	....	....	....	....
160 Lbs.	Draft Required, Ins. of Water	...	.032	.040	.054	.073	.097	....	....	....	....	....	....	....	....
Available Fuel	Chimney Size, Ins.	...	8x8	8x8	8x8	8x8	8x8	....	....	....	....	....	....	....	....
120 Lbs.	Chimney Height, Ft.	...	30	30	30	30	30	....	....	....	....	....	....	....	....
1-S-6	Time Available Fuel Will Last, Hrs.*	...	26.4	19.2	15.0	12.3	10.4	9.0	7.9	....	....	....	....	....	....
1-W-6	Overall Efficiency of Boiler, %	...	67.5	67.4	67.1	66.8	66.5	65.8	65.3	....	....	....	....	....	....
Grate Area	Stack Gas Temperature, °F	...	440	495	545	600	655	705	760	....	....	....	....	....	....
2.25 Sq. Ft.	Fuel Burned per Sq. Ft. of Grate														
Fuel Cap.	per Hr., Lbs.	...	2.5	3.5	4.4	5.4	6.4	7.4	8.5	....	....	....	....	....	....
200 Lbs.	Draft Required, Ins. of Water	...	.025	.028	.037	.053	.070	.090	.115	....	....	....	....	....	....
Available Fuel	Chimney Size, Ins.	...	8x8	8x8	8x8	8x8	8x8	8x8	8x8	....	....	....	....	....	....
150 Lbs.	Chimney Height, Ft.	...	30	30	30	30	30	30	30	....	....	....	....	....	....

NO. 1 IDEAL REDFLASH BOILER—Performance Data—Steam and Water

Number of Boiler	Output in Equivalent Direct Radiation (Sq. Ft.)														
	Steam (240 B.t.u.)	125	200	275	350	425	500	575	650	725	800	875	950	1025	1100
	Water (150 B.t.u.)	200	320	440	560	680	800	920	1040	1160	1280	1400	1520	1640	1760
	Output in (1000's) B.t.u. per Hr.	30	48	66	84	102	120	138	156	174	192	210	228	246	264
1-S-7	Time Available Fuel Will Last, Hrs.*	...	...	23.6	18.5	15.1	12.8	11.0	9.7	8.6	7.7	....	....	....	....
1-W-7	Overall Efficiency of Boiler, %	...	...	69.3	68.9	68.6	68.4	67.7	67.2	66.5	65.5	....	....	....	....
Grate Area	Stack Gas Temperature, °F.	...	...	475	520	570	620	665	710	760	805	....	....	....	....
2.71 Sq. Ft. Fuel Cap.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	...	...	2.8	3.6	4.4	5.2	6.0	6.9	7.7	8.6				
240 Lbs.	Draft Required, Ins. of Water	...	...	.025	.028	.038	.05	.067	.087	.108	.132	....	....	....	....
Available Fuel	Chimney Size, Ins.	...	...	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	....	....	....	....
180 Lbs.	Chimney Height, Ft.	...	...	35	35	35	35	35	35	35	35	....	....	....	....
1-S-8	Time Available Fuel Will Last, Hrs.*	...	...	....	22.1	18.1	15.3	13.2	11.6	10.3	9.2	8.3	7.6	....	....
1-W-8	Overall Efficiency of Boiler, %	...	...	....	70.5	70 3	69.8	69.5	68.9	68.4	67.6	66.7	65.5	....	....
Grate Area	Stack Gas Temperature, °F.	...	...	....	500	540	580	625	670	710	755	795	840	....	....
3.17 Sq. Ft. Fuel Cap.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	...	...	....	3.0	3.7	4.3	5.0	5.7	6.4	7.2	8.0	8.7	....	....
280 Lbs.	Draft Required, Ins. of Water	...	...	....	.025	.030	.040	.053	.067	.085	.104	.125	.147	....	....
Available Fuel	Chimney Size, Ins.	...	...	....	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	....	....
210 Lbs.	Chimney Height, Ft.	...	...	....	35	35	35	35	35	35	35	35	35	....	....
1-S-9	Time Available Fuel Will Last, Hrs.*	...	...	....	25.7	21.1	17.9	15.5	13.6	12.2	10.9	9.9	9.0	8.2	7.4
1-W-9	Overall Efficiency of Boiler, %	...	...	....	71.9	71.7	71.5	71.3	70.8	70.5	69.7	69.2	68.3	66.9	65.5
Grate Area	Stack Gas Temperature, °F.	...	...	....	485	520	560	600	640	670	710	750	790	825	860
3.63 Sq. Ft. Fuel Cap.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	...	...	....	2.6	3.1	3.7	4.3	4.9	5.4	6.1	6.7	7.3	8.1	8 9
320 Lbs.	Draft Required, Ins. of Water	...	...	....	.022	.025	.032	.040	.051	.065	.078	.095	.110	.129	.147
Available Fuel	Chimney Size, Ins.	...	...	....	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12
240 Lbs.	Chimney Height, Ft.	...	...	....	35	35	35	35	35	35	35	35	35	35	35

*Based on fuel of 12,500 B.t.u. per lb. For economical operation, add piping tax to Direct Radiation Load (Equivalent Direct Radiation); then select boiler from figures enclosed by heavy lines. For further explanation on boiler selection, see page A9. For guarantee, see page A7.

NO. 2 IDEAL REDFLASH BOILER—Performance Data—Steam and Water

Number of Boiler	Output in Equivalent Direct Radiation (Sq. Ft.)															
	Steam (240 B.t.u.)	300	425	550	675	800	925	1050	1175	1300	1425	1550	1675	1800	1925	2050
	Water (150 B.t.u.)	480	680	880	1080	1280	1480	1680	1880	2080	2280	2480	2680	2880	3080	3280
	Output in (1000's) B.t.u. per Hr.	72	102	132	162	192	222	252	282	312	342	372	402	432	462	492
2-S-5	Time Available Fuel Will Last, Hrs.*	29.2	20.5	15.8	12.8	10.7	9.2	8.0	...	...	...	...	...	...	...	...
2-W-5	Overall Efficiency of Boiler, %	70.0	69.7	69.5	69.0	68.5	68.0	67.0	...	...	...	...	...	...	...	...
Grate Area	Stack Gas Temperature, °F.	420	490	560	640	720	790	860	...	...	...	...	...	...	...	...
3.50 Sq. Ft.	Fuel Burned per Sq. Ft. of Grate															
Fuel Cap.	Per Hr., Lbs.	2.3	3.3	4.3	5.4	6.4	7.5	8.6	...	...	...	...	...	...	...	...
320 Lbs.	Draft Required, Ins. of Water	0.010	0.020	.030	.041	.060	.075	.095	...	...	...	...	...	...	...	...
Available Fuel	Chimney Size, Ins.	8x12	8x12	8x12	8x12	8x12	8x12	8x12	...	...	...	...	...	...	...	...
240 Lbs.	Chimney Height, Ft.	35	35	35	35	35	35	35	...	...	...	...	...	...	...	...
2-S-6	Time Available Fuel Will Last, Hrs.*	...	26.0	20.0	16.2	13.6	11.7	10.2	9.0	8.0	...	...	...	...	...	...
2-W-6	Overall Efficiency of Boiler, %	...	70.7	70.5	70.2	69.7	69.5	68.5	67.7	66.5	...	...	...	...	...	...
Grate Area	Stack Gas Temperature, °F.	...	450	510	570	630	690	750	800	860	...	...	...	...	...	...
4.39 Sq. Ft.	Fuel Burned per Sq. Ft. of Grate															
Fuel Cap.	Per Hr., Lbs.	...	2.6	3.4	4.2	5.0	5.8	6.7	7.6	8.5	...	...	...	...	...	...
400 Lbs.	Draft Required, Ins. of Water	...	.010	.025	.035	.050	.060	.075	.090	.110	...	...	...	...	...	...
Available Fuel	Chimney Size, Ins.	...	12x12	12x12	12x12	12x12	12x12	12x12	12x12	12x12	...	...	...	...	...	...
300 Lbs.	Chimney Height, Ft.	...	35	35	35	35	35	35	35	35	...	...	...	...	...	...
2-S-7	Time Available Fuel Will Last, Hrs.*	...	...	24.4	19.7	16.6	14.3	12.4	11.1	9.9	8.9	8.0	...	...	...	...
2-W-7	Overall Efficiency of Boiler, %	...	...	71.5	71.0	70.7	70.5	69.7	69.3	68.5	67.5	66.5	...	...	...	...
Grate Area	Stack Gas Temperature, °F.	...	...	480	530	580	630	680	740	780	840	890	...	...	...	...
5.28 Sq. Ft.	Fuel Burned per Sq. Ft. of Grate															
Fuel Cap.	Per Hr., Lbs.	...	...	2.8	3.5	4.1	4.8	5.5	6.1	6.9	7.7	8.5	...	...	...	...
480 Lbs.	Draft Required, Ins. of Water	...	...	.020	.030	.040	.050	.065	.080	.095	.110	.125	...	...	...	...
Available Fuel	Chimney Size, Ins.	...	...	12x12	12x12	12x12	12x12	12x12	12x12	12x12	12x12	12x12	...	...	...	...
360 Lbs.	Chimney Height, Ft.	...	...	35	35	35	35	35	35	35	35	35	...	...	...	...

NO. 2 IDEAL REDFLASH BOILER—Performance Data—Steam and Water

Number of Boiler	Output in Equivalent Direct Radiation (Sq. Ft.)															
	Steam (240 B.t.u.)	300	425	550	675	800	925	1050	1175	1300	1425	1550	1675	1800	1925	2050
	Water (150 B.t.u.)	480	680	880	1080	1280	1480	1680	1880	2080	2280	2480	2680	2880	3080	3280
	Output in (1000's) B.t.u. per Hr	72	102	132	162	192	222	252	282	312	342	372	402	432	462	492
2-S-8 2-W-8 Grate Area 6.17 Sq. Ft. Fuel Cap. 560 Lbs. Available Fuel 420 Lbs.	Time Available Fuel Will Last, Hrs.*	...	....	28.4	23.2	19.4	16.7	14.7	13.0	11.7	10.5	9.6	8.8	8.1	....	....
	Overall Efficiency of Boiler, %	...	...	71.5	71.5	71.0	70.7	70.5	70.0	69.5	68.5	68.0	67.0	66.5	....	....
	Stack Gas Temperature, °F	...	...	450	500	540	590	640	680	720	770	820	860	900	....	....
	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	...	...	2.4	2.9	3.5	4.1	4.6	5.2	5.8	6.5	7.1	7.7	8.4	....	....
	Draft Required, Ins. of Water	...	...	.015	.020	.030	.045	.055	.070	.080	.095	.110	.130	.140	....	....
	Chimney Size, Ins.	...	...	12x12	12x12	12x12	12x12	12x12	12x12	12x12	12x12	12x12	12x12	12x12	....	....
	Chimney Height, Ft.	...	...	40	40	40	40	40	40	40	40	40	40	40	....	....
2-S-9 2-W-9 Grate Area 7.06 Sq. Ft. Fuel Cap. 640 Lbs. Available Fuel 480 Lbs.	Time Available Fuel Will Last, Hrs.*	...	...	...	26.6	22.4	19.3	16.9	15.1	13.6	12.2	11.1	10.2	9.4	8.6	8.0
	Overall Efficiency of Boiler, %	...	...	...	71.7	71.5	71.5	71.0	70.7	70.5	69.5	69.0	68.5	67.5	66.5	65.5
	Stack Gas Temperature, °F	...	...	...	480	520	550	590	630	670	700	740	780	820	860	900
	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	...	...	...	2.6	3.0	3.5	4.0	4.5	5.0	5.6	6.1	6.7	7.2	7.9	8.5
	Draft Required, Ins. of Water	...	...	...	.020	.030	.040	.050	.060	.075	.085	.100	.110	.125	.140	.155
	Chimney Size, Ins.	...	...	...	12x16	12x16	12x16	12x16	12x16	12x16	12x16	12x16	12x16	12x16	12x16	12x16
	Chimney Height, Ft.	...	...	...	40	40	40	40	40	40	40	40	40	40	40	40

*Based on fuel of 12,500 B.t.u. per lb. For economical operation, add piping tax to Direct Radiation Load (Equivalent Direct Radiation); then select boiler from figures enclosed by heavy lines. For further explanation on boiler selection, see page **A9**. For guarantee, see page A7.

NO. 2 IDEAL REDFLASH BOILER—Performance Data—Steam and Water

Number of Boiler	Output in Equivalent Direct Radiation (240 B.t.u.)																
	Steam (240 B.t.u.)........	**675**	**800**	**925**	**1050**	**1175**	**1300**	**1425**	**1550**	**1675**	**1800**	**1925**	**2050**	**2175**	**2300**	**2425**	**2550**
	Water (150 B.t.u.)........	**1080**	**1280**	**1480**	**1680**	**1880**	**2080**	**2280**	**2480**	**2680**	**2880**	**3080**	**3280**	**3480**	**3680**	**3880**	**4080**
	Output in (1000's) B.t.u. per Hr................	**162**	**192**	**222**	**252**	**282**	**312**	**342**	**372**	**402**	**432**	**462**	**492**	**522**	**552**	**582**	**612**
2-S-10 **2-W-10**	Time Available Fuel Will Last, Hrs.*.............	30.1	25.3	21.9	19.2	17.1	15.4	13.9	12.7	11.7	10.7	10.0	9.3	8.6	8.0	...	...
Grate Area 7.95 Sq. Ft.	Overall Efficiency of Boiler, %..................	72.3	72.0	72.0	71.7	71.5	71.0	70.5	70.0	69.5	68.6	68.3	67.5	66.5	65.5	...	...
	Stack Gas Temperature, °F.	460	490	520	560	600	630	660	700	740	770	800	840	880	910	...	...
Fuel Cap. 720 Lbs.	Fuel Burned per Sq. Ft. of Grate Per Hr., Lbs......	2.3	2.7	3.1	3.5	4.0	4.4	4.9	5.4	5.8	6.4	6.8	7.3	7.9	8.5	...	...
Available Fuel 540 Lbs.	Draft Required, Ins. of Water	.020	.025	.035	.045	.055	.070	.080	.090	.100	.120	.130	.140	.160	.170	...	...
	Chimney Size, Ins...... ..	12x16	12x16	12x16	12x16	12x16	12x16	12x16	12x16	12x16	12x16	12x16	12x16	12x16	12x16	...	...
	Chimney Height, Ft.......	45	45	45	45	45	45	45	45	45	45	45	45	45	45	...	...
2-S-11 **2-W-11**	Time Available Fuel Will Last, Hrs.*............	...	28.4	24.5	21.6	19.2	17.2	15.6	14.3	13.1	12.1	11.3	10.4	9.8	9.1	8.5	8.0
Grate Area 8.84 Sq. Ft.	Overall Efficiency of Boiler, %..................	...	72.7	72.5	72.3	72.0	71.5	71.0	70.7	70.5	70.0	69.5	68.5	68.0	67.0	66.2	65.0
	Stack Gas Temperature, °F.	...	470	500	540	560	600	630	660	690	730	750	780	820	850	880	920
Fuel Cap. 800 Lbs.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs......	...	2.4	2.8	3.1	3.5	4.0	4.4	4.8	5.2	5.6	6.0	6.5	6.9	7.5	8.0	8.5
Available Fuel 600 Lbs.	Draft Required, Ins. of Water	...	.025	.030	.040	.050	.060	.070	.080	.090	.105	.120	.130	.140	.155	.170	.180
	Chimney Size, Ins...... ..	...	12x16	12x16	12x16	12x16	12x16	12x16	12x16	12x16	12x16	12x16	12x16	12x16	12x16	12x16	12x16
	Chimney Height, Ft.......	...	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45

NO. 3 IDEAL REDFLASH BOILER—Performance Data—Steam and Water

Number of Boiler	Output in Equivalent Direct Radiation (Sq. Ft.)																
	Steam (240 B.t.u.)	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3250	3500	3750	4000	4250	4500
	Water (150 B.t.u.)	1200	1600	2000	2400	2800	3200	3600	4000	4400	4800	5200	5600	6000	6400	6800	7200
	Output in (1000's) B.t.u. per Hr.	180	240	300	360	420	480	540	600	660	720	780	840	900	960	1020	1080
3-S-6 3-W-6	Time Available Fuel Will Last, Hrs.*	21.9	16.3	12.9	10.6	9.0	7.8	6.8	6.1	...	...	...	...	...	...	...	...
Grate Area 6.65 Sq. Ft.	Overall Efficiency of Boiler, %	71.2	70.5	69.9	69.0	68.3	67.5	66.7	65.6	...	...	...	...	...	...	...	...
	Stack Gas Temperature, °F	335	390	445	500	555	610	665	720	...	...	...	...	...	...	...	...
Fuel Cap. 590 Lbs.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	3.0	4.1	5.2	6.3	7.4	8.5	9.8	10.9	...	...	...	...	...	...	...	...
	Draft Required, Ins. of Water	0.02	0.03	0.04	0.05	0.07	0.08	0.09	0.11	...	...	...	...	...	...	...	...
Available Fuel 443 Lbs.	Chimney Size, Ins.	12x16	12x16	12x16	12x16	12x16	12x16	12x16	12x16	...	...	...	...	...	...	...	...
	Chimney Height, Ft.	40	40	40	40	40	40	40	40	...	...	...	...	...	...	...	...
3-S-7 3-W-7	Time Available Fuel Will Last, Hrs.*	...	20.0	15.8	13.0	11.0	9.5	8.4	7.4	6.7	6.0	...	...	...	...	...	...
Grate Area 8.00 Sq. Ft.	Overall Efficiency of Boiler, %	...	72.0	71.3	70.5	69.6	68.7	67.8	66.8	65.9	64.8	...	...	...	...	...	...
	Stack Gas Temperature, °F	...	385	435	485	535	585	635	685	735	785	...	...	...	...	...	...
Fuel Cap. 710 Lbs.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	...	3.3	4.2	5.1	6.1	7.0	8.0	9.0	10.0	11.1	...	...	...	...	...	...
	Draft Required, Ins. of Water	...	0.03	0.03	0.04	0.05	0.06	0.08	0.09	0.11	0.12	...	...	...	...	...	...
Available Fuel 533 Lbs.	Chimney Size, Ins.	...	16x16	16x16	16x16	16x16	16x16	161x6	16x16	16x16	16x16	...	...	...	...	...	...
	Chimney Height, Ft.	...	45	45	45	45	45	45	45	45	45	...	...	...	...	...	...
3-S-8 3-W-8	Time Available Fuel Will Last, Hrs.*	...	...	18.7	15.4	13.1	11.3	10.0	8.8	7.9	7.2	6.5	6.0	...	...	...	...
Grate Area 9.35 Sq. Ft.	Overall Efficiency of Boiler, %	...	...	72.2	71.5	70.7	69.9	69.1	68.2	67.3	66.4	65.4	64.5	...	...	...	...
	Stack Gas Temperature, °F	...	...	390	440	490	540	590	640	690	740	790	840	...	...	...	...
Fuel Cap. 830 Lbs.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	...	...	3.6	4.3	5.1	5.9	6.7	7.6	8.4	9.3	10.3	11.1	...	...	...	...
	Draft Required, Ins. of Water	...	...	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.11	0.12	0.14	...	...	...	...
Available Fuel 623 Lbs.	Chimney Size, Ins.	...	...	16x16	16x16	16x16	16x16	16x16	16x16	16x16	16x16	16x16	16x16	...	...	...	...
	Chimney Height, Ft.	...	...	50	50	50	50	50	50	50	50	50	50	...	...	...	...

*Based on fuel of 12,500 B.t.u. per lb. For economical operation, add piping tax to Direct Radiation Load (Equivalent Direct Radiation); then select boiler from figures enclosed by heavy lines. For further explanation on boiler selection, see page A9. For guarantee, see page A7.

NO. 3 IDEAL REDFLASH BOILER—Performance Data—Steam and Water

Number of Boiler	Output in Bquivalent Direct Radiation (Sq. Ft.)																			
	Steam (240 B.t.u.)	1500	1750	2000	2250	2500	2750	3000	3250	3500	3750	4000	4250	4500	4750	5000	5250	5500	5750	6000
	Water (150 B.t.u.)	2400	2800	3200	3600	4000	4400	4800	5200	5600	6000	6400	6800	7200	7600	8000	8400	8800	9200	9600
	Output in (1000's) B.t.u. per Hr.	360	420	480	540	600	660	720	780	840	900	960	1020	1080	1140	1200	1260	1320	1380	1440
3-S-9 **3-W-9**	Time Available Fuel Will Last, Hrs.*	17.9	15.1	13.1	11.5	10.3	9.2	8.4	7.6	7.0	6.4	6.0	...	...	...	...	...	...	...	...
Grate Area 10.7 Sq. Ft.	Overall Efficiency of Boiler, %	72.0	71.3	70.5	69.8	69.1	68.3	67.5	66.7	65.8	65.0	64.1	...	...	...	...	...	...	...	...
	Stack Gas Temperature, °F.	430	475	520	565	610	655	700	745	790	835	880	...	...	...	...	...	...	...	...
Fuel Cap. 950 Lbs.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	3.7	4.4	5.1	5.8	6.5	7.2	7.9	8.8	9.5	10.4	11.1	...	...	...	...	...	...	...	...
	Draft Required, Ins. of Water	0.03	0.04	0.05	0.06	0.07	0.08	0.10	0.11	0.13	0.14	0.16	...	...	...	...	...	...	...	...
Available Fuel 713 Lbs.	Chimney Size, Ins.	16x20	16x20	16x20	16x20	16x20	16x20	16x20	16x20	16x20	16x20	16x20	...	...	...	...	...	...	...	...
	Chimney Height, Ft.	50	50	50	50	50	50	50	50	50	50	50	...	...	...	...	...	...	...	...
3-S-10 **3-W-10**	Time Available Fuel Will Last, Hrs.*	...	17.3	15.0	13.2	11.7	10.6	9.6	8.8	8.0	7.4	6.9	6.4	5.9	...	...	...	...	...	...
Grate Area 12.05 Sq. Ft.	Overall Efficiency of Boiler, %	...	72.2	71.5	70.9	70.2	69.5	68.7	68.0	67.2	66.3	65.5	64.7	63.7	...	...	...	...	...	...
	Stack Gas Temperature, °F.	...	470	510	550	590	630	670	710	750	790	830	870	910	...	...	...	...	...	...
Fuel Cap. 1070 Lbs.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	...	3.0	4.4	5.0	5.7	6.3	7.0	7.6	8.3	9.0	9.7	10.4	11.3	...	...	...	...	...	...
	Draft Required, Ins. of Water	...	0.04	0.05	0.05	0.06	0.07	0.09	0.10	0.11	0.13	0.14	0.16	0.18	...	...	...	...	...	...
Available Fuel 803 Lbs.	Chimney Size, Ins.	...	16x20	16x20	16x20	16x20	16x20	16x20	16x20	16x20	16x20	16x20	16x20	16x20	...	...	...	...	...	...
	Chimney Height, Ft.	...	55	55	55	55	55	55	55	55	55	55	55	55	...	...	...	...	...	...
3-S-11 **3-W-11**	Time Available Fuel Will Last, Hrs.*	...	...	16.8	14.8	13.2	11.9	10.8	9.9	9.1	8.4	7.7	7.2	6.7	6.3	5.9	...	...	...	...
Grate Area 13.4 Sq. Ft.	Overall Efficiency of Boiler, %	...	...	72.3	71.7	71.0	70.4	69.7	69.0	68.2	67.5	66.7	65.8	64.9	64.1	63.1	...	...	...	...
	Stack Gas Temperature, °F.	...	...	470	505	545	585	620	660	695	735	775	810	850	890	925	...	...	...	...
Fuel Cap. 1190 Lbs.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	...	...	4.0	4.5	5.1	5.6	6.2	6.7	7.3	7.9	8.6	9.3	9.9	10.6	11.3	...	...	...	...
	Draft Required, Ins. of Water	...	...	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.13	0.14	0.16	0.18	0.20	...	...	...	...
Available Fuel 893 Lbs.	Chimney Size, Ins.	...	...	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	...	...	...	...
	Chimney Height, Ft.	...	...	60	60	60	60	60	60	60	60	60	60	60	60	60	...	...	...	...

Number of Boiler	Output in Equivalent Direct Radiation (Sq. Ft.)																			
	Steam (240 B.t.u.)	1500	1750	2000	2250	2500	2750	3000	3250	3500	3750	4000	4250	4500	4750	5000	5250	5500	5750	6000
	Water (150 B.t.u.)	2400	2800	3200	3600	4000	4400	4800	5200	5600	6000	6400	6800	7200	7600	8000	8400	8800	9200	9600
	Output in (1000's) B.t.u. per Hr.	360	420	480	540	600	660	720	780	840	900	960	1020	1080	1140	1200	1260	1320	1380	1440
3-S-12 **3-W-12**	Time Available Fuel Will Last, Hrs.*	....	....	18.7	16.4	14.7	13.2	12.0	11.0	10.1	9.4	8.7	8.1	7.5	7.1	6.6	6.2	5.9	...	...
Grate Area 14.75 Sq. Ft.	Overall Efficiency of Boiler, %	....	....	72.8	72.2	71.6	71.0	70.4	69.8	69.2	68.6	67.9	67.2	66.4	65.6	64.7	63.8	62.9	...	...
	Stack Gas Temperature, °F.	....	....	450	485	520	555	590	625	660	695	730	765	800	835	870	905	940	...	...
Fuel Cap. 1310 Lbs.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	....	....	3.6	4.1	4.5	5.0	5.5	6.1	6.6	7.1	7.7	8.2	8.9	9.4	10.1	10.7	11.3	...	...
Available Fuel 983 Lbs.	Draft Required, Ins. of Water	....	....	0.04	0.05	0.05	0.06	0.07	0.08	0.09	0.10	0.12	0.13	0.15	0.16	0.18	0.20	0.22	...	...
	Chimney Size, Ins.	....	....	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	...	...
	Chimney Height, Ft.	....	....	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	...	...
3-S-13 **3-W-13**	Time Available Fuel Will Last, Hrs.*	....	....	20.5	18.1	16.2	14.6	13.3	12.2	11.2	10.4	9.7	9.0	8.4	7.9	7.4	7.0	6.6	6.2	5.9
Grate Area 16.10 Sq. Ft.	Overall Efficiency of Boiler, %	....	....	73.4	72.9	72.4	71.9	71.3	70.8	70.3	69.8	69.2	68.6	67.9	67.2	66.5	65.7	64.9	64.0	63.2
	Stack Gas Temperature, °F.	....	....	430	460	490	525	555	590	630	660	695	725	760	790	820	855	885	920	950
Fuel Cap. 1430 Lbs.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	....	....	3.3	3.7	4.1	4.6	5.0	5.5	5.9	6.4	6.9	7.4	7.9	8.4	9.0	9.5	10.1	10.7	11.3
Available Fuel 1073 Lbs.	Draft Required, Ins. of Water	....	....	0.04	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.12	0.14	0.15	0.17	0.19	0.21	0.23	0.25
	Chimney Size, Ins.	....	....	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20
	Chimney Height, Ft.	....	....	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65

*Based on fuel of 12,500 B.t.u. per lb. For economical operation, add piping tax to Direct Radiation Load (Equivalent Direct Radiation); then select boiler from figures enclosed by heavy lines. For further explanation on boiler selection, see page A9. For guarantee, see page A7.

No. 4 IDEAL REDFLASH BOILER—Performance Data—Steam and Water

Number of Boiler	Output in Equivalent Direct Radiation (Sq. Ft.)																		
	Steam (240 B.t.u.)	1625	2000	2375	2750	3125	3500	3875	4250	4625	5000	5375	5750	6125	6500	6875	7250	7625	8000
	Water (150 B.t.u.)	2600	3200	3800	4400	5000	5600	6200	6800	7400	8000	8600	9200	9800	10400	11000	11600	12200	12800
	Output in (1000's) B.t.u. per Hr.	390	480	570	660	750	840	930	1020	1110	1200	1290	1380	1470	1560	1650	1740	1830	1920
4-S-7 **4-W-7**	Time Available Fuel Will Last, Hrs.*	16.2	13.0	10.9	9.2	8.0	7.1	6.2	5.5	4.9	4.4	...	...	...	...	...	...	...	...
Grate Area 11.70 Sq. Ft.	Overall Efficiency of Boiler, %	71.0	70.3	69.5	68.5	67.5	66.5	65.0	63.5	61.5	59.5	...	...	...	...	...	...	...	...
	Stack Gas Temperature, °F.	480	550	600	680	740	800	870	940	1000	1060	...	...	...	...	...	...	...	...
Fuel Cap. 950 Lbs.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	3.8	4.7	5.6	6.6	7.6	8.6	9.8	11.1	12.4	13.9	...	...	...	...	...	...	...	...
Available Fuel 713 Lbs.	Draft Required, Ins. of Water	0.03	0.05	0.07	0.10	0.12	0.14	0.17	0.19	0.22	0.25	...	...	...	...	...	...	...	...
	Chimney Size, Ins.	16x20	16x20	16x20	16x20	16x20	16x20	16x20	16x20	16x20	16x20	...	...	...	...	...	...	...	...
	Chimney Height, Ft.	50	50	50	50	50	50	50	50	50	50	...	...	...	...	...	...	...	...
4-S-8 **4-W-8**	Time Available Fuel Will Last, Hrs.*	...	15.4	12.8	11.0	9.5	8.4	7.5	6.7	6.0	5.5	5.0	4.6	...	...	...	...	...	...
Grate Area 13.68 Sq. Ft.	Overall Efficiency of Boiler, %	...	71.0	70.0	69.5	68.5	67.5	66.7	65.5	64.5	63.5	62.2	60.5	...	...	...	...	...	...
	Stack Gas Temperature, °F.	...	520	560	620	680	730	780	840	900	950	1000	1050	...	...	...	...	...	...
Fuel Cap. 1110 Lbs.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	...	4.0	4.8	5.5	6.4	7.3	8.1	9.1	10.2	11.1	12.2	13.3	...	...	...	...	...	...
Available Fuel 833 Lbs.	Draft Required, Ins. of Water	...	0.04	0.06	0.08	0.11	0.13	0.15	0.17	0.20	0.22	0.24	0.27	...	...	...	...	...	...
	Chimney Size, Ins.	...	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	...	...	...	...	...	...
	Chimney Height, Ft.	...	55	55	55	55	55	55	55	55	55	55	55	...	...	...	...	...	...
4-S-9 **4-W-9**	Time Available Fuel Will Last, Hrs.*	...	17.7	14.9	12.7	11.0	9.7	8.7	7.8	7.1	6.5	5.9	5.4	5.0	4.6	...	...	...	...
Grate Area 15.66 Sq. Ft.	Overall Efficiency of Boiler, %	...	71.5	71.0	70.5	69.5	68.6	68.1	67.0	66.1	65.0	64.0	63.0	61.6	60.5	...	...	...	...
	Stack Gas Temperature, °F.	...	500	540	590	640	680	730	780	820	860	910	960	1000	1050	...	...	...	...
Fuel Cap. 1270 Lbs.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	...	3.4	4.1	4.8	5.5	6.3	7.0	7.8	8.6	9.4	10.3	11.3	12.2	13.2	...	...	...	...
Available Fuel 953 Lbs.	Draft Required, Ins. of Water	...	0.03	0.04	0.06	0.08	0.10	0.12	0.15	0.17	0.19	0.22	0.24	0.26	0.29	...	...	...	...
	Chimney Size, Ins.	...	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	...	...	...	...
	Chimney Height, Ft.	...	55	55	55	55	55	55	55	55	55	55	55	55	55	...	...	...	...

No. 4 IDEAL REDFLASH BOILER—Performance Data—Steam and Water

Number of Boiler	Output in Equivalent Direct Radiation (Sq. Ft.) Steam (240 B.t.u.) Water (150 B.t.u.)	1625 2600	2000 3200	2375 3800	2750 4400	3125 5000	3500 5600	3875 6200	4250 6800	4625 7400	5000 8000	5375 8600	5750 9200	6125 9800	6500 10400	6875 11000	7250 11600	7625 12200	8000 12800
	Output in (1000's) B.t.u. per Hr.	**390**	**480**	**570**	**660**	**750**	**840**	**930**	**1020**	**1110**	**1200**	**1290**	**1380**	**1470**	**1560**	**1650**	**1740**	**1830**	**1920**
4-S-10 **4-W-10**	Time Available Fuel Will Last, Hrs.*	...	20.1	16.8	14.4	12.5	11.1	10.0	9.0	8.2	7.4	6.8	6.3	5.8	5.4	5.0	4.7	...	...
Grate Area 17.64 Sq. Ft.	Overall Efficiency of Boiler, %	...	72.0	71.5	71.0	70.1	69.5	69.1	68.3	67.5	66.5	65.7	64.5	63.5	63.0	62.0	60.5	...	...
	Stack Gas Temperature, °F.	...	480	520	560	600	640	680	720	760	800	840	880	920	960	1000	1040	...	...
Fuel Cap. 1430 Lbs.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	...	3.0	3.6	4.2	4.9	5.5	6.1	6.8	7.4	8.2	9.0	9.7	10.5	11.3	12.2	12.9	...	...
Available Fuel 1073 Lbs.	Draft Required Ins. of Water	...	0.02	0.03	0.05	0.07	0.09	0.11	0.13	0.15	0.17	0.19	0.21	0.23	0.26	0.28	0.30	...	...
	Chimney Size, Ins.	...	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	...	...
	Chimney Height, Ft.	...	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	...	...
4-S-11 **4-W-11**	Time Available Fuel Will Last, Hrs.*	...	...	18.9	16.2	14.1	12.5	11.2	10.2	9.2	8.4	7.8	7.2	6.7	6.2	5.8	5.4	5.1	4.8
Grate Area 19.62 Sq. Ft.	Overall Efficiency of Boiler, %	...	...	72.0	71.5	71.0	70.5	69.7	69.5	68.5	67.7	67.0	66.5	65.5	64.5	64.0	63.0	62.5	61.5
	Stack Gas Temperature, °F.	...	...	500	540	580	610	640	680	720	750	790	820	860	890	920	960	1000	1030
Fuel Cap. 1590 Lbs.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	...	...	3.2	3.8	4.3	4.9	5.4	6.0	6.6	7.2	7.8	8.4	9.1	9.8	10.5	11.3	11.9	12.7
Available Fuel 1193 Lbs.	Draft Required Ins. of Water	...	...	0.03	0.04	0.06	0.08	0.09	0.11	0.13	0.15	0.17	0.19	0.21	0.23	0.25	0.27	0.29	0.31
	Chimney Size, Ins.	...	...	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24
	Chimney Height, Ft.	...	...	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65

*Based on fuel of 12,500 B.t.u. per lb. For economical operation, add piping tax to Direct Radiation Load (Equivalent Direct Radiation); then select boiler from figures enclosed by heavy lines. For further explanation on boiler selection, see page A9. For guarantee see page A7.

No. 4 IDEAL REDFLASH BOILER—Performance Data—Steam and Water

Number of Boiler	Output in Equivalent Direct Radiation (Sq. Ft.) Steam (240 B.t.u.) Water (150 B.t.u.)	3125 5000	3500 5600	3875 6200	4250 6800	4625 7400	5000 8000	5375 8600	5750 9200	6125 9800	6500 10400	6875 11000	7250 11600	7625 12200	8000 12800	8375 13400	8750 14000	9125 14600	9500 15200
	Output in (1000's) B.t.u. per Hr.	750	840	930	1020	1110	1200	1290	1380	1470	1560	1650	1740	1830	1920	2010	2100	2190	2280
4-S-12 4-W-12	Time Available Fuel Will Last, Hrs.*	15.7	13.9	12.5	11.3	10.3	9.4	8.7	8.0	7.5	6.9	6.5	6.1	5.7	5.4	5.1	4.8	...	...
Grate Area 21.60 Sq. Ft.	Overall Efficiency of Boiler, %	71.5	71.0	70.5	70.0	69.5	68.7	68.3	67.5	67.0	66.1	65.5	64.5	63.5	62.7	62.0	61.5	...	...
Fuel Cap. 1750 Lbs.	Stack Gas Temperature, °F.	560	590	620	660	680	720	750	780	810	840	880	910	940	980	1000	1040	...	...
	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs	3.9	4.4	4.9	5.4	5.9	6.5	7.0	7.6	8.1	8.8	9.4	10.0	10.7	11.3	11.9	12.7	...	...
Available Fuel 1313 Lbs.	Draft Required Ins. of Water	0.05	0.07	0.08	0.10	0.12	0.13	0.15	0.17	0.19	0.21	0.23	0.25	0.27	0.29	0.31	0.33	...	...
	Chimney Size, Ins.	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	...	...
	Chimney Height, Ft.	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	...	...
4-S-13 4-W-13	Time Available Fuel Will Last, Hrs.*	17.3	15.3	13.8	12.5	11.3	10.4	9.7	8.9	8.3	7.8	7.2	6.8	6.4	6.0	5.7	5.4	5.1	4.8
Grate Area 23.58 Sq. Ft.	Overall Efficiency of Boiler, %	72.5	72.0	71.5	71.0	70.3	69.7	69.5	68.5	68.0	67.5	66.6	66.0	65.3	64.5	63.7	63.0	62.3	61.5
Fuel Cap. 1910 Lbs.	Stack Gas Temperature °F.	550	570	600	630	660	690	710	740	770	800	830	860	890	920	950	980	1010	1040
	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs	3.5	4.0	4.4	4.9	5.4	5.9	6.3	6.8	7.3	7.8	8.5	9.0	9.5	10.2	10.7	11.3	11.9	12.7
Available Fuel 1433 Lbs.	Draft Required Ins. of Water	0.04	0.05	0.06	0.08	0.09	0.11	0.13	0.14	0.16	0.18	0.20	0.22	0.24	0.26	0.28	0.30	0.33	0.35
	Chimney Size, Ins.	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24
	Chimney Height, Ft.	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75

NO. 5 IDEAL REDFLASH BOILER—Performance Data—Steam and Water

Number of Boiler	Output in Equivalent Direct Radiation (Sq. Ft.) Steam (240 B.t.u.)...........	2500	3050	3600	4150	4700	5250	5800	6350	6900	7450	8000	8550	9100	9650	10200	10750	11300	11850
	Water (150 B.t.u.)...........	4000	4880	5760	6640	7520	8400	9280	10160	11040	11920	12800	13680	14560	15440	16320	17200	18080	18960
	Output in (1000's) B.t.u. per Hr.	600	732	864	996	1128	1260	1392	1524	1656	1788	1920	2052	2184	2316	2448	2580	2712	2844
5-S-8 **5-W-8**	Time Available Fuel Will Last, Hrs.*..................	14.5	11.8	9.9	8.5	7.4	6.5	5.8	5.2	4.7	4.3	3.9	..	...	...	..	..	...	...
Grate Area 18.83 Sq. Ft.	Overall Efficiency of Boiler, %	72.5	72.0	71.5	70.5	69.5	68.5	67.5	66.0	64.5	63.5	62.0	...	...	...	...	...	...	...
	Stack Gas Temperature, °F...	430	500	580	640	720	780	840	900	960	1000	1040	...	...	...	...	...	...	...
Fuel Cap. 1281 Lbs.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.........	3.5	4.3	5.2	6.0	6.9	7.9	8.8	9.8	10.9	11.9	13.1	...	...	...	...	..	..	...
	Draft Required, Ins. of Water..	0.04	0.06	0.07	0.08	0.10	0.13	0.15	0.17	0.20	0.23	0.26	...	..	...	...	...	...	...
Available Fuel 961 Lbs.	Chimney Size, Ins...........	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	...	...	...	...	...	...	...
	Chimney Height, Ft...	70	70	70	70	70	70	70	70	70	70	70	..	...	...	...	..	..	...
5-S-9 **5-W-9**	Time Available Fuel Will Last, Hrs.*..................	16.6	13.6	11.4	9.0	8.6	7.7	6.8	6.2	5.6	5.1	4.6	4.3	3.9	..	...	...	...	..
Grate Area 21.52 Sq. Ft.	Overall Efficiency of Boiler, %	72.5	72.5	72.0	71.6	71.2	70.5	69.5	68.5	67.5	66.5	65.0	64.0	62.5	...	...	..	...	...
	Stack Gas Temperature, °F...	390	450	520	580	660	720	760	820	880	920	970	1010	1040	...	...	...	...	...
Fuel Cap. 1464 Lbs.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.........	3.1	3.7	4.5	5.2	5.9	6.6	7.5	8.2	9.1	10.0	11.1	11.9	13.1	...	...	...	...	...
	Draft Required, Ins. of Water..	0.03	0.04	0.05	0.07	0.09	0.11	0.13	0.15	0.17	0.20	0.22	0.25	0.27	...	...	...	...	...
Available Fuel 1098 Lbs.	Chimney Size, Ins...........	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	...	...	...	...	...
	Chimney Height, Ft...	75	75	75	75	75	75	75	75	75	75	75	75	75	...	...	...	...	...
5-S-10 **5 W-10**	Time Available Fuel Will Last, Hrs.*..................	...	15.4	13.0	11.2	9.9	8.8	7.8	7.0	6.4	5.9	5.4	5.0	4.6	4.2	3.9	...	...	...
Grate Area 24.21 Sq. Ft.	Overall Efficiency of Boiler, %	...	73.0	72.7	72.5	72.0	71.5	70.5	69.5	68.7	68.0	67.0	66.0	64.5	63.5	62.5	...	...	...
	Stack Gas Temperature, °F...	...	410	470	540	590	650	700	760	820	860	910	950	1000	1030	1050	...	...	...
Fuel Cap. 1647 Lbs.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.........	...	3.3	3.9	4.6	5.2	5.8	6.5	7.3	8.0	8.6	9.4	10.2	11.3	12.1	13.1	...	...	...
	Draft Required, Ins. of Water..	...	0.03	0.04	0.05	0.06	0.08	0.10	0.13	0.15	0.18	0.20	0.22	0.25	0.27	0.30	...	...	...
Available Fuel 1235 Lbs.	Chimney Size, Ins...........	...	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	...	...	...
	Chimney Height, Ft.........	...	75	75	75	75	75	75	75	75	75	75	75	75	75	75	...	...	...

*Based on fuel of 12,500 B.t.u. per lb. For economical operation, add piping tax to Direct Radiation Load (Equivalent Direct Radiation); then select boiler from figures enclosed by heavy lines. For further explanation on boiler selection, see page A9. For guarantee, see page A7.

NO. 5 IDEAL REDFLASH BOILER—Performance Data—Steam and Water

Number of Boiler	Output in Equivalent Direct Radiation (Sq. Ft.)																							
	Steam (240 B.t.u.)........	3600	4150	4700	5250	5800	6350	6900	7450	8000	8550	9100	9650	10200	10750	11300	11850	12400	12950	13500	14050	14600	15150	15700
	Water (150 B.t.u.)........	5760	6640	7520	8400	9280	10160	11040	11920	12800	13680	14560	15440	16320	17200	18080	18960	19840	20720	21600	22480	23360	24240	25120
	Output in (1000's) B.t.u. per Hr...............	864	996	1128	1260	1392	1524	1656	1788	1920	2052	2184	2316	2448	2580	2712	2844	2976	3108	3240	3372	3504	3636	3768
5-S-11 5-W-11	Time Available Fuel Will Last, Hrs.*...........	14.6	12.6	11.0	9.7	8.8	7.9	7.2	6.6	6.1	5.6	5.2	4.8	4.5	4.2	4.0	...	...	...	...	...	...	...	...
Grate Area 26.90 Sq. Ft.	Overall Efficiency of Boiler, %....................	73.3	73.0	72.5	71.5	71.0	70.5	69.5	68.5	68.0	67.0	66.3	65.0	64.0	63.5	62.5	...	...	...	...	...	...	...	...
Fuel Cap. 1830 Lbs.	Stack Gas Temperature, °F.	430	490	540	600	650	700	750	800	840	890	920	960	1000	1020	1040	...	...	...	...	...	...	...	...
	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs......	3.5	4.0	4.6	5.3	5.8	6.5	7.1	7.7	8.4	9.1	9.8	10.6	11.3	12.1	12.8	...	...	...	...	...	...	...	...
Available Fuel 1373 Lbs.	Draft Required, Ins. of Water	0.02	0.03	0.04	0.06	0.07	0.09	0.12	0.14	0.16	0.19	0.21	0.24	0.27	0.30	0.32	...	...	...	...	...	...	...	...
	Chimney Size, Ins........	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	...	...	...	...	...	...	...	...
	Chimney Height, Ft.......	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	...	...	...	...	...	...	...	...
5-S-12 5-W-12	Time Available Fuel Will Last, Hrs.*...........	11.7	10.1	8.8	7.8	7.1	6.4	5.8	5.4	5.0	4.6	4.2	4.0	3.7	3.5	3.3	3.1	2.9	...	...	...	...	...	...
Grate Area 21.52 Sq. Ft	Overall Efficiency of Boiler, %....................	73.5	73.2	72.7	72.0	71.6	71.3	70.5	70.0	69.5	68.5	67.5	67.0	66.5	65.5	64.5	63.5	62.5	...	...	...	...	...	...
Fuel Cap. 1464 Lbs.	Stack Gas Temperature, °F.	390	440	490	540	590	640	680	730	770	820	850	890	920	960	990	1010	1040	...	...	...	...	...	...
	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs......	4.4	5.0	5.8	6.5	7.2	8.0	8.8	9.5	10.2	11.1	12.1	12.8	13.8	14.6	15.5	16.5	17.6	...	...	...	...	...	...
Available Fuel 1098 Lbs.	Draft Required, Ins. of Water	0.07	0.08	0.09	0.12	0.13	0.16	0.19	0.22	0.25	0.28	0.32	0.35	0.39	0.42	0.46	0.49	0.54	...	...	...	...	...	...
	Chimney Size, Ins........	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	...	...	...	...	...	...
	Chimney Height, Ft.......	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	...	...	...	...	...	...

NO. 5 IDEAL REDFLASH BOILER—Performance Data—Steam and Water

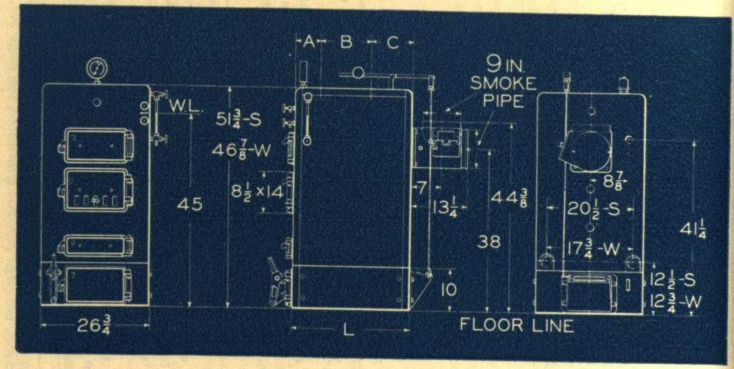
Number of Boiler	Output in Equivalent Direct Radiation (Sq. Ft.) Steam (240 B.t.u.)	3600	4150	4700	5250	5800	6350	6900	7450	8000	8550	9100	9650	10200	10750	11300	11850	12400	12950	13500	14050	14600	15150	15700
	Water (150 B.t.u.)	5760	6640	7520	8400	9280	10160	11040	11920	12800	13680	14560	15440	16320	17200	18080	18960	19840	20720	21600	22480	23360	24240	25120
	Output in (1000's) B.t.u. per Hr.	864	996	1128	1260	1392	1524	1656	1788	1920	2052	2184	2316	2448	2580	2712	2844	2976	3108	3240	3372	3504	3636	3768
5-S-13 **5-W-13**	Time Available Fuel Will Last, Hrs.*	...	11.4	10.1	8.9	8.0	7.3	6.7	6.1	5.6	5.2	4.8	4.5	4.3	4.0	3.7	3.5	3.3	3.2	3.0	...	...	...	...
Grate Area	Overall Efficiency of Boiler, %	...	73.5	73.5	73.0	72.5	72.0	71.5	70.5	69.7	69.5	68.5	68.0	67.5	66.5	65.5	65.0	64.0	63.5	62.5	...	...	...	...
24.21 Sq. Ft.	Stack Gas Temperature, °F.	...	420	460	500	550	600	640	680	720	760	800	840	880	910	940	970	1000	1020	1040	...	...	...	...
Fuel Cap. 1647 Lbs.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	...	4.5	5.0	5.7	6.4	7.0	7.6	8.4	9.1	9.8	10.6	11.3	11.8	12.7	13.8	14.6	15.5	16.4	17.0	...	...	...	...
	Draft Required, Ins. of Water	...	0.07	0.08	0.09	0.11	0.14	0.16	0.18	0.22	0.24	0.27	0.30	0.34	0.36	0.40	0.44	0.47	0.50	0.54	...	...	...	...
Available Fuel	Chimney Size, Ins.	...	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	...	...	...	...
1235 Lbs.	Chimney Height, Ft.	...	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	...	...	...	...
5-S-14 **5-W-14**	Time Available Fuel Will Last, Hrs.	...	11.4	10.1	8.9	8.0	7.3	6.7	6.1	5.7	5.3	4.9	4.6	4.3	4.0	3.8	3.6	3.4	3.2	3.0	2.9	2.7	...	...
Grate Area	Overall Efficiency of Boiler, %	...	73.7	73.5	73.0	72.5	72.0	71.5	71.0	70.5	70.0	69.0	68.5	67.7	67.5	66.5	66.0	65.0	64.5	63.5	63.0	62.5	...	...
24.21 Sq. Ft.	Stack Gas Temperature, °F.	...	390	430	480	510	560	600	640	670	710	750	780	820	850	880	920	940	970	1000	1020	1040	...	...
Fuel Cap. 1647 Lbs.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	...	4.5	5.1	5.7	6.4	7.0	7.6	8.4	8.9	9.6	10.4	11.1	11.8	12.7	13.4	14.2	15.0	15.9	17.0	17.6	18.9	...	...
	Draft Required, Ins. of Water	...	0.06	0.07	0.08	0.10	0.12	0.14	0.17	0.20	0.22	0.25	0.28	0.32	0.35	0.38	0.41	0.45	0.48	0.52	0.56	0.59	...	...
Available Fuel	Chimney Size, Ins.	...	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	...	...
1235 Lbs.	Chimney Height, Ft.	...	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	...	...
5-S-15 **5-W-15**	Time Available Fuel Will Last, Hrs.*	...	...	11.3	10.0	9.1	8.2	7.5	6.9	6.4	5.9	5.5	5.1	4.8	4.5	4.3	4.0	3.8	3.6	3.4	3.2	3.1	2.9	2.8
Grate Area	Overall Efficiency of Boiler, %	...	...	74.0	73.7	73.5	72.5	72.0	71.5	71.0	70.0	69.5	69.3	68.5	68.0	67.5	66.5	65.7	65.3	64.5	63.5	62.5	62.0	60.5
26.90 Sq. Ft.	Stack Gas Temperature, °F.	...	...	400	440	480	520	560	600	630	670	700	740	770	800	840	860	880	920	940	960	970	980	1000
Fuel Cap. 1830 Lbs.	Fuel Burned per Sq. Ft. of Grate per Hr., Lb.	...	...	4.5	5.1	5.6	6.2	6.8	7.4	8.0	8.7	9.3	10.0	10.6	11.4	11.9	12.8	13.4	14.2	15.0	16.0	16.5	17.6	18.3
	Draft Required, Ins. of Water	...	...	0.06	0.07	0.08	0.10	0.13	0.15	0.18	0.20	0.23	0.26	0.30	0.32	0.36	0.39	0.43	0.46	0.50	0.54	0.57	0.60	0.66
Available Fuel	Chimney Size, Ins.	...	...	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36
1373 Lbs.	Chimney Height, Ft.	...	...	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95

*Based on fuel of 12,500 B. t. u. per lb. For economical operation, add piping tax to Direct Radiation Load (Equivalent Direct Radiation); then select boiler from figures enclosed by heavy lines. For further explanation on boiler selection, see page A9. For guarantee, see page A7.

No. 1 Ideal Redflash Boiler—Steam and Water

Dimensions—Outlets—Inlets

BURNS ALL FUELS



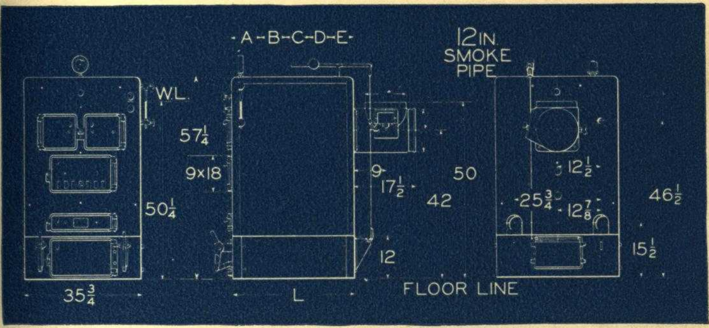
No. of Boiler		Outlets No. and Size	Inlets No. and Size	Dimensions, Inches, for Locating Flow Tappings			
Steam	Water			A	B	C	L
1-S-4	1-W-4	1-3″	2-2″	11½	....	4½	16
1-S-5	1-W-5	1-3″	2-2″	15½	....	4½	20
1-S-6	1-W-6	2-3″	2-2″	12	7½	4½	24
1-S-7	1-W-7	2-3″	2-2″	8	15½	4½	28
1-S-8	1-W-8	2-3″	2-2″	12	15½	4½	32
1-S-9	1-W-9	2-3″	2-2″	16	15½	4½	36

ASSEMBLAGE OF SECTIONS

No. of Boiler		Assemblage
Steam	Water	
1-S-4	1-W-4	F-BX
1-S-5	1-W-5	A-FC-BX
1-S-6	1-W-6	F-CX-BX
1-S-7	1-W-7	A-FCX-C-BX
1-S-8	1-W-8	F-CX-C-BX
1-S-9	1-W-9	A-FC-CX-C-BX

A = 4″ Front Section. C = Center Section. BX = Back Connecting Section.
F = 8″ Front Section. CX = Center Connecting Section. FC = Front Center Section.
FCX = Front Center Connecting Section.

No. 2 Ideal Redflash Boiler—Steam and Water
ANTHRACITE
Dimensions—Outlets—Inlets



Number of Boiler		Outlets No. and Size	Inlets No. and Size	Dimensions, Inches, for Locating Flow Tappings					
Steam	Water			A	B	C	D	E	L
2-S-5	2-W-5	2-4″	2-4″	10	10	..	..	5	25
2-S-6	2-W-6	2-4″	2-4″	15	10	..	..	5	30
2-S-7	2-W-7	2-4″	2-4″	10	20	..	..	5	35
2-S-8	2-W-8	2-4″	2-4″	15	20	..	..	5	40
2-S-9	2-W-9	2-4″	2-4″	10	30	..	..	5	45
2-S-10	2-W-10	2-4″	2-4″	15	30	..	..	5	50
2-S-11	2-W-11	3-4″	2-4″	10	20	20	..	5	55

ASSEMBLAGE OF SECTIONS

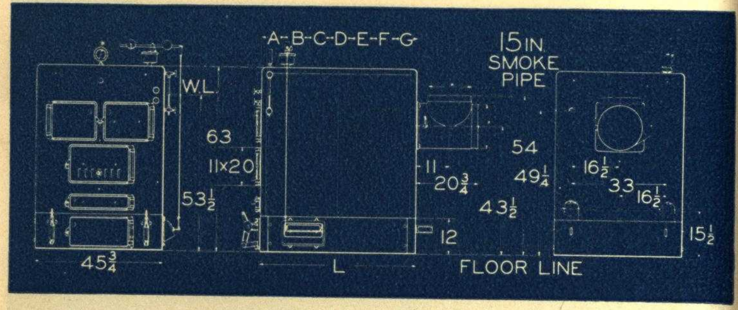
Number of Boiler		Assemblage
Steam	Water	
2-S-5	2-W-5	A-FCX-BX
2-S-6	2-W-6	F-CX-BX
2-S-7	2-W-7	A-FCX-C-BX
2-S-8	2-W-8	F-CX-C-BX
2-S-9	2-W-9	A-FCX-C-C-BX
2-S-10	2-W-10	F-CX-C-C-BX
2-S-11	2-W-11	A-FCX-C-CX-C-BX

A = 5″ Front Section.
F = 10″ Front Section.
FCX = Front Center Connecting Section.
C = Center Section.
CX = Center Connecting Section.
BX = Back Connecting Section.

No. 3 Ideal Redflash Boiler—Steam and Water

ANTHRACITE

Dimensions—Outlets—Inlets



Number of Boiler		Outlets No. and Size	Inlets No. and Size	Dimensions—Inches, for Locating Flow Tappings							
Steam	Water			A	B	C	D	E	F	G	L
3-S-6	3-W-6	2-4″	2-5″	9	18	. .	. .	. .	. .	9	36
3-S-7	3-W-7	3-4″	2-5″	9	12	12	. .	. .	. .	9	42
3-S-8	3-W-8	3-4″	2-5″	9	18	12	. .	. .	. .	9	48
3-S-9	3-W-9	4-4″	2-5″	9	12	12	12	. .	. .	9	54
3-S-10	3-W-10	4-4″	2-5″	9	12	12	12	. .	. .	15	60
3-S-11	3-W-11	4-4″	2-5″	9	12	18	18	. .	. .	9	66
3-S-12	3-W 12	5-4″	2-5″	9	18	12	12	12	. .	9	72
3-S-13	3-W-13	5-4″	2-5″	9	18	18	12	12	. .	9	78

ASSEMBLAGE OF SECTIONS

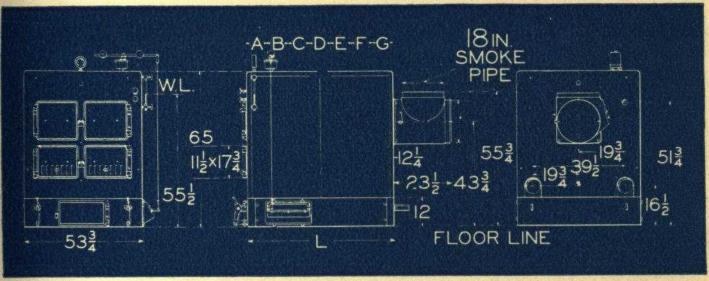
Number of Boiler		Assemblage
Steam	Water	
3-S-6	3-W-6	F-FCX-C-C-RCX-B
3-S-7	3-W-7	F-FCX-C-CX-C-RCX-B
3-S-8	3-W-8	F-FCX-C-C-CX-RC-RCX-B
3-S-9	3-W-9	F-FCX-C-CX-C-CX-RC-RCX-B
3-S-10	3-W-10	F-FCX-C-CX-C-CX-C-RCX-RC-B
3-S-11	3-W-11	F-FCX-C-CX-C-C-CX-C-RC-RCX-B
3-S-12	3-W-12	F-FCX-C-C-CX-C-CX-C-RCX-RC-RCX-B
3-S-13	3-W-13	F-FCX-C-C-CX-C-C-CX-C-RCX-RC-RCX-B

F = Front Section.
FCX = Front Center Connecting Section.
C = Center Section.
CX = Center Connecting Section.
RC = Rear Center Uptake Section.
RCX = Rear Center Uptake Connecting Section.
B = Back Section.

No. 4 Ideal Redflash Boiler—Steam and Water

ANTHRACITE

Dimensions—Outlets—Inlets



Number of Boiler		Outlets Number and Size	Inlets Number and Size	Dimensions, Ins., for Locating Flow Tappings							
Steam	Water			A	B	C	D	E	F	G	L
4-S-7	4-W-7	3-4″	2-6″	10½	14	14	..	..	..	10½	49
4-S-8	4-W-8	3-4″	2-6″	10½	14	14	..	..	..	17½	56
4-S-9	4-W-9	4-4″	2-6″	10½	14	14	14	..	..	10½	63
4-S-10	4-W-10	4-4″	2-6″	10½	14	14	14	..	..	17½	70
4-S-11	4-W-11	5-4″	2-6″	10½	14	14	14	14	..	10½	77
4-S-12	4-W-12	5-4″	2-6″	10½	14	14	14	14	..	17½	84
4-S-13	4-W-13	6-4″	2-6″	10½	14	14	14	14	14	10½	91

ASSEMBLAGE OF SECTIONS

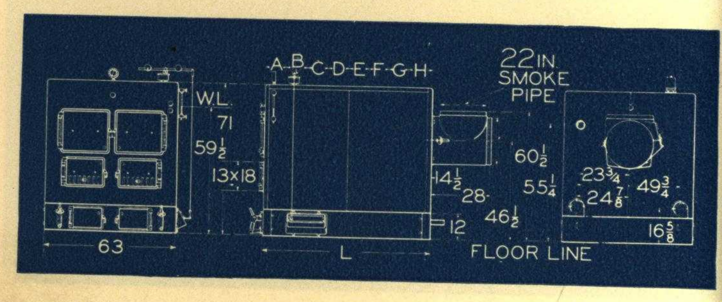
Number of Boiler		Assemblage
Steam	Water	
4-S-7	4-W-7	F-FCX-C-CX-RC-RCX-B
4-S-8	4-W-8	F-FCX-C-CX-C-RCX-RC-B
4-S-9	4-W-9	F-FCX-C-CX-C-RCX-RC-RCX-B
4-S-10	4-W-10	F-FCX-C-CX-C-CX-RC-RCX-RC-B
4-S-11	4-W-11	F-FCX-C-CX-C-CX-C-RCX-RC-RCX-B
4-S-12	4-W-12	F-FCX-C-CX-C-CX-C-CX-RC-RCX-RC-B
4-S-13	4-W-13	F-FCX-C-CX-C-CX-C-CX-C-RCX-RC-RCX-B

F = Front Section.
FCX = Front Center Connecting Section.
C = Center Section.
CX = Center Connecting Section.
RC = Rear Center Section.
RCX = Rear Center Connecting Section.
B = Back Section.

No. 5 Ideal Redflash Boiler—Steam and Water

ANTHRACITE

Dimensions—Outlets—Inlets



Number of Boiler		Outlets Number and Size	Inlets Number and Size	Dimensions, Inches, for Locating Flow Tappings								
Steam	Water			A	B	C	D	E	F	G	H	L
5-S-8	5-W-8	3-5″	2-6″	12	24	16	..	..	..	..	12	64
5-S-9	5-W-9	4-5″	2-6″	12	16	16	16	..	..	..	12	72
5-S-10	5-W-10	4-5″	2-6″	12	16	24	16	..	..	..	12	80
5-S-11	5-W-11	5-5″	2-6″	12	16	16	16	16	..	..	12	88
5-S-12	5-W-12	5-5″	2-6″	12	16	16	16	16	..	..	20	96
5-S-13	5-W-13	5-5″	2-6″	12	16	24	16	24	..	..	12	104
5-S-14	5-W-14	6-5″	2-6″	12	16	16	24	16	16	..	12	112
5-S-15	5-W-15	6-5″	2-6″	12	16	24	16	24	16	..	12	120

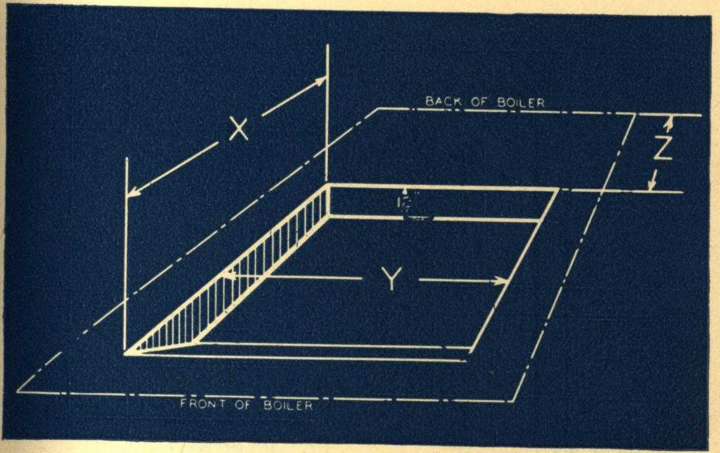
ASSEMBLAGE OF SECTIONS

Number of Boiler		Assemblage
Steam	Water	
5-S-8	5-W-8	F-FCX-C-C-CX-RC-RCX-B
5-S-9	5-W-9	F-FCX-C-CX-C-CX-RC-RCX-B
5-S-10	5-W-10	F-FCX-C-CX-C-C-CX-RC-RCX-B
5-S-11	5-W-11	F-FCX-C-CX-C-CX-C-CX-RC-RCX-B
5-S-12	5-W-12	F-FCX-C-CX-C-CX-C-CX-BW-RCX-RC-BD
5-S-13	5-W-13	F-FCX-C-CX-C-C-CX-C-CX-BW-RC-RCX-BD
5-S-14	5-W-14	F-FCX-C-CX-C-CX-C-C-CX-BW-RCX-RC-RCX-BD
5-S-15	5-W-15	F-FCX-C-CX-C-C-CX-C-CX-C-BW-RCX-RC-RCX-BD

F = Front Section.
FCX = Front Center Connecting Section.
C = Center Section.
CX = Center Connecting Section.

BW = Bridgewall Section.
RC = Rear Center Section.
RCX = Rear Center Connecting Section.
B = Back Section.
BD = Back with Cleanout Door.

IDEAL REDFLASH BOILERS
ASHPIT DIMENSIONS



No. 2 Ideal Redflash Boiler

Number of Sections	Dimensions in Inches			
	Depth	"X"	"Y"	"Z"
6	12	22	29	4
7	12	27	29	4
8	12	32	29	4
9	12	37	29	4
10	12	42	29	4
11	12	47	29	4
12	12	52	29	4
13	12	57	29	4

No. 4. Ideal Redflash Boiler

Number of Sections	Dimensions in Inches			
	Depth	"X"	"Y"	"Z"
7	12	39	47	5
8	12	46	47	5
9	12	53	47	5
10	12	60	47	5
11	12	67	47	5
12	12	74	47	5
13	12	81	47	5
14	12	88	47	5

No. 3. Ideal Redflash Boiler

Number of Sections	Dimensions in Inches			
	Depth	"X"	"Y"	"Z"
6	12	28	39	4
7	12	34	39	4
8	12	40	39	4
9	12	46	39	4
10	12	52	29	4
11	12	58	39	4
12	12	64	39	4
13	12	70	39	4
14	12	76	39	4

No. 5. Ideal Redflash Boiler

Number of Sections	Dimensions in Inches			
	Depth	"X"	"Y"	"Z"
8	12	54	57	5
9	12	62	57	5
10	12	70	57	5
11	12	78	57	5
12	12	61	57	30
13	12	61	57	38
14	12	69	57	38
15	12	69	57	46

Arrangement of Grate Bars

Ideal Redflash Boilers

Boiler Number	Grates
1-S or W-4	2
1-S or W-5	3
1-S or W-6	4
1-S or W-7	5
1-S or W-8	6
1-S or W-9	7

Boiler Number	Left Front	Right Rear
2-S or W- 5	3	...
2-S or W- 6	4	...
2-S or W- 7	5	...
2-S or W- 8	6	...
2-S or W- 9	7	...
2-S or W-10	4	4
2-S or W-11	5	4

Boiler Number	Left Front	Right Rear
3-S or W- 6	4	...
3-S or W- 7	3	2
3-S or W- 8	3	3
3-S or W- 9	4	3
3-S or W-10	4	4
3-S or W-11	5	4
3-S or W-12	5	5
3-S or W-13	6	5

Boiler Number	Left Front	Right Rear
4-S or W- 7	3	2
4-S or W- 8	3	3
4-S or W- 9	4	3
4-S or W-10	4	4
4-S or W-11	5	4
4-S or W-12	5	5
4-S or W-13	6	5

Boiler Number	Left Front	Right Front	Dead Plates		
			Single	Double	Rear
5-S or W- 8	3	3	...	...	...
5-S or W- 9	4	3	...	...	...
5-S or W-10	4	4	...	...	...
5-S or W-11	5	4	...	...	...
5-S or W-12	4	3	1	...	1
5-S or W-13	4	4	1	...	1
5-S or W-14	4	4	...	1	1
5-S or W-15	5	4	...	1	1

IDEAL WATER TUBE BOILERS

IDEAL WATER TUBE BOILERS

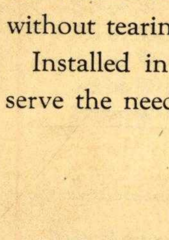
ANTHRACITE

NATION-WIDE use in well known residences, apartment houses, churches, hotels, clubs, stores and public buildings has identified the Ideal Water Tube Boiler as one of the best adapted and most efficient boilers in its field.

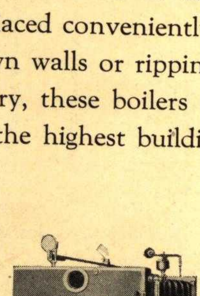
An extensive series of water-backed vertical tubes divide the body of water into many thin streams, and expose an unusually large amount of heat-absorbing surface. This design, united with the other features of the boiler—the scientifically balanced proportions of grate area, direct heating surface, flue area, and gas travel unite in accomplishing quick, economical, and durable heating service with the minimum amount of attention.

The sectional construction of Ideal Water Tube Boilers allow them to be placed conveniently in new or old buildings without tearing down walls or ripping up floors.

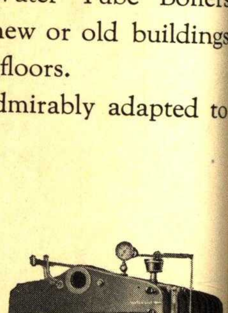
Installed in battery, these boilers are admirably adapted to serve the needs of the highest buildings.



23-Inch Boiler

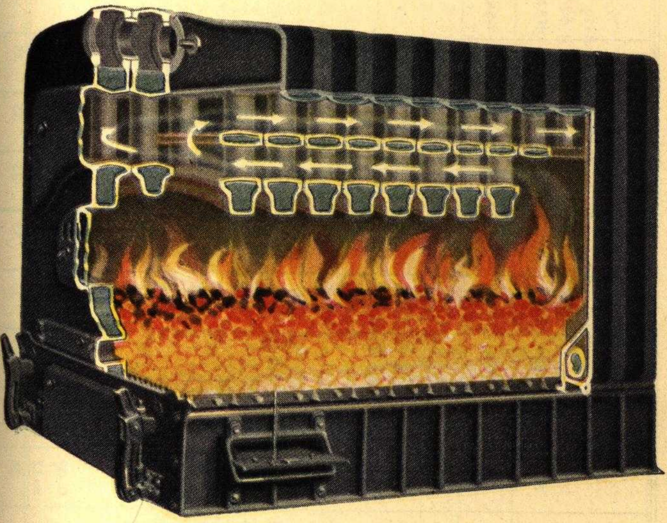


29-Inch Boiler



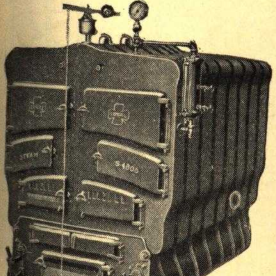
36-Inch Boiler

IDEAL WATER TUBE BOILERS

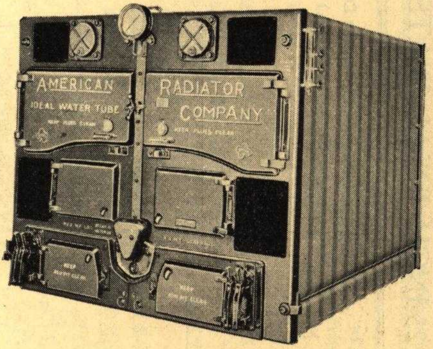


Cross Section View of 36-Inch Boiler

Tapped for Excelso Heater on Order



48-Inch Boiler



79-Inch Boiler

23-INCH IDEAL WATER TUBE BOILER—Performance Data—Steam and Water

Number of Boiler	Output in Equivalent Direct Radiation (Sq. Ft.)													
	Steam (240 B.t.u.)	150	225	300	375	450	525	600	675	750	825	900	975	1050
	Water (150 B.t.u.)	240	360	480	600	720	840	960	1080	1200	1320	1440	1560	1680
	Output in (1000's) B.t.u. per Hr.	36	54	72	90	108	126	144	162	180	198	216	234	252
S-2305 W-2305 Grate Area 2.72 Sq. Ft. Fuel Cap. 164 Lbs. Available Fuel 123 Lbs.	Time Available Fuel Will Last, Hrs.*	32.3	21.4	15.9	12.6	10.3	8.7	7.5	....	....	....	....	....	....
	Overall Efficiency of Boiler, %	75.6	75.1	74.4	73.5	72.5	71.5	70.3	....	....	....	....	....	....
	Stack Gas Temperature, °F	300	355	410	460	510	560	610	....	....	....	....	....	....
	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	1.4	2.1	2.8	3.6	4.4	5.2	6.0	....	....	....	....	....	....
	Draft Required, Ins. of Water	0.01	0.02	0.03	0.04	0.05	0.06	0.07	....	....	....	....	....	....
	Chimney Size, Ins.	8x12	8x12	8x12	8x12	8x12	8x12	8x12	....	....	....	....	....	....
	Chimney Height, Ft.	30	30	30	30	30	30	30	....	....	....	....	....	....
S-2306 W-2306 Grate Area 3.36 Sq. Ft. Fuel Cap. 203 Lbs. Available Fuel 152 Lbs.	Time Available Fuel Will Last, Hrs.*	....	26.6	19.8	15.7	12.9	11.0	9.5	8.3	7.3	....	....	....	....
	Overall Efficiency of Boiler, %	....	75.5	75.0	74.5	73.5	72.8	72.0	70.8	69.5	....	....	....	....
	Stack Gas Temperature, °F	....	330	375	420	465	510	550	590	630	....	....	....	....
	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	....	1.7	2.3	2.9	3.5	4.1	4.8	5.5	6.2	....	....	....	....
	Draft Required, Ins. of Water	....	0.02	0.02	0.03	0.04	0.04	0.05	0.06	0.08	....	....	....	....
	Chimney Size, Ins.	....	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	....	....	....	....
	Chimney Height, Ft.	....	35	35	35	35	35	35	35	35	....	....	....	....

23-INCH IDEAL WATER TUBE BOILER—Performance Data—Steam and Water

Number of Boiler	Output in Equivalent Direct Radiation (Sq. Ft.)													
	Steam (240 B.t.u.)	150	225	300	375	450	525	600	675	750	825	900	975	1050
	Water (150 B.t.u.)	240	360	480	600	720	840	960	1080	1200	1320	1440	1560	1680
	Output in (1000's) B.t.u. per Hr.	36	54	72	90	108	126	144	162	180	198	216	234	252
S-2307 W-2307	Time Available Fuel Will Last, Hrs.*	....	....	23.8	19.0	15.7	13.4	11.6	10.2	9.1	8.2	7.4	....	....
	Overall Efficiency of Boiler, %	....	....	75.5	75.0	74.5	74.0	73.5	72.9	72.1	71.1	70.5	....	....
Grate Area 4.00 Sq. Ft.	Stack Gas Temperature, °F.	....	....	345	385	420	460	495	530	565	600	630	....	....
Fuel Cap. 242 Lbs.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	....	....	1.9	2.4	2.9	3.4	3.9	4.5	5.0	5.5	6.1	....	....
	Draft Required, Ins. of Water	....	....	0.02	0.03	0.03	0.04	0.04	0.05	0.06	0.07	0.08	....	....
Available Fuel 182 Lbs.	Chimney Size, Ins.	....	....	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	....	....
	Chimney Height, Ft.	....	....	35	35	35	35	35	35	35	35	35	....	....
S-2308 W-2308	Time Available Fuel Will Last, Hrs.*	....	....	27.8	22.1	18.3	15.6	13.5	12.0	10.7	9.6	8.7	7.9	7.3
	Overall Efficiency of Boiler, %	....	....	76.0	75.5	75.0	74.5	74.0	73.5	73.0	72.0	71.5	70.5	69.5
Grate Area 4.64 Sq. Ft.	Stack Gas Temperature. °F.	....	....	325	360	390	425	460	490	520	550	580	610	635
Fuel Cap. 281 Lbs.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	....	....	1.6	2.1	2.5	2.9	3.4	3.8	4.2	4.7	5.2	5.7	6.2
	Draft Required, Ins. of Water	....	....	0.01	0.02	0.02	0.03	0.03	0.04	0.05	0.06	0.07	0.07	0.08
Available Fuel 211 Lbs.	Chimney Size, Ins.	....	....	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12
	Chimney Height, Ft.	....	....	35	35	35	35	35	35	35	35	35	35	35

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*Based on fuel of 12,500 B.t.u. per lb. For economical operation, add piping tax to Direct Radiation Load (Equivalent Direct Radiation); then select boiler from figures enclosed by heavy lines. For further explanation on boiler selection, see page A9. For guarantee, see page A7.

23-INCH IDEAL WATER TUBE BOILER—Performance Data—Steam and Water

Number of Boiler	Output in Equivalent Direct Radiation (Sq. Ft.)														
	Steam (240 B.t.u.)............	375	450	525	600	675	750	825	900	975	1050	1125	1200	1275	1350
	Water (150 B.t.u.)............	600	720	840	960	1080	1200	1320	1440	1560	1680	1800	1920	2040	2160
	Output in (1000's) B.t.u. per Hr.	90	108	126	144	162	180	198	216	234	252	270	288	306	324
S-2309 **W-2309**	Time Available Fuel Will Last, Hrs.*....................	25.4	21.0	17.9	15.5	13.7	12.3	11.0	10.1	9.2	8.4	7.8	7.2	....	....
Grate Area 5.28 Sq. Ft.	Overall Efficiency of Boiler, %..	76.0	75.5	75.3	74.5	74.0	73.5	72.8	72.5	71.5	70.8	70.0	69.5	....	....
	Stack Gas Temperature, °F.....	340	370	395	425	450	480	505	535	565	585	610	635	....	....
Fuel Cap. 320 Lbs.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs..............	1.8	2.2	2.5	2.9	3.3	3.7	4.1	4.5	4.9	5.4	5.8	6.3	....	....
	Draft Required, Ins. of Water...	0.02	0.02	0.03	0.03	0.04	0.04	0.05	0.06	0.06	0.07	0.08	0.08	....	....
Available Fuel 240 Lbs.	Chimney Size, Ins.............	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	8x12	....	....
	Chimney Height, Ft...........	40	40	40	40	40	40	40	40	40	40	40	40	....	....
S-2310 **W-2310**	Time Available Fuel Will Last, Hrs.*....................	28.6	23.7	20.2	17.6	15.5	13.8	12.5	11.4	10.4	9.6	8.9	8.2	7.7	7.2
Grate Area 5.92 Sq. Ft.	Overall Efficiency of Boiler, %..	76.5	76.0	75.7	75.3	74.5	74.0	73.5	73.1	72.5	72.0	71.5	70.5	70.1	69.5
	Stack Gas Temperature, °F.....	325	350	375	405	425	450	475	500	525	550	570	595	615	640
Fuel Cap. 359 Lbs.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs..............	1.6	1.9	2.3	2.6	2.9	3.3	3.6	4.0	4.4	4.7	5.1	5.5	5.9	6.3
	Draft Required, Ins. of Water...	0.01	0.02	0.02	0.03	0.03	0.04	0.04	0.05	0.06	0.06	0.07	0.07	0.08	0.09
Available Fuel 269 Lbs.	Chimney Size, Ins.............	12x12	12x12	12x12	12x12	12x12	12x12	12x12	12x12	12x12	12x12	12x12	12x12	12x12	12x12
	Chimney Height, Ft...........	40	40	40	40	40	40	40	40	40	40	40	40	40	40

29-INCH IDEAL WATER TUBE BOILER—Performance Data—Steam and Water

Number of Boiler	Output in Equivalent Direct Radiation (Sq. Ft.) Steam (240 B.t.u.) Water (150 B.t.u.)	400 640	600 960	800 1280	1000 1600	1200 1920	1400 2240	1600 2560	1800 2880	2000 3200	2200 3520	2400 3840	2600 4160	2800 4480	3000 4800
	Output in (1000's) B.t.u. per Hr.	96	144	192	240	288	336	384	432	480	528	576	624	672	720
S-2905 **W-2905** Grate Area 4.84 Sq. Ft. Fuel Cap 350 Lbs. Available Fuel 263 Lbs.	Time Available Fuel Will Last, Hrs.*	22.9	15.3	11.4	9.0	7.3	6.1	5.2	....	....	....	....	....	....	....
	Overall Efficiency of Boiler, %	67.0	67.0	66.5	65.5	64.0	62.2	60.5	....	....	....	....	....	....	....
	Stack Gas Temperature, °F	340	410	480	550	620	690	760	....	....	....	....	....	....	....
	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	2.4	3.6	4.8	6.0	7.4	8.9	10.5	....	....	....	....	....	....	....
	Draft Required, Ins. of Water	0.03	0.05	0.06	0.08	0.10	0.12	0.14	....	....	....	....	....	....	....
	Chimney Size, Ins.	12x16	12x16	12x16	12x16	12x16	12x16	12x16	....	....	....	....	....	....	....
	Chimney Height, Ft.	35	35	35	35	35	35	35	....	....	....	....	....	....	....
S-2906 **W-2906** Grate Area 6.05 Sq. Ft. Fuel Cap. 437 Lbs. Available Fuel 328 Lbs.	Time Available Fuel Will Last, Hrs.*	....	19.4	14.5	11.4	9.4	7.9	6.8	5.9	5.1	....	....	....	....	....
	Overall Efficiency of Boiler, %	....	68.0	67.8	67.0	66.0	65.0	63.5	61.8	60.0	....	....	....	....	....
	Stack Gas Temperature, °F	....	380	450	510	580	640	700	770	840	....	....	....	....	....
	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	....	2.8	3.7	4.8	5.8	6.9	8.0	9.2	10.6	....	....	....	....	....
	Draft Required, Ins. of Water	....	0.04	0.05	0.06	0.08	0.10	0.12	0.14	0.16	....	....	....	....	....
	Chimney Size, Ins.	....	12x16	12x16	12x16	12x16	12x16	12x16	12x16	12x16	....	....	....	....	....
	Chimney Height, Ft.	....	40	40	40	40	40	40	40	40	....	....	....	....	....
S-2907 **W-2907** Grate Area 7.26 Sq. Ft. Fuel Cap. 523 Lbs. Available Fuel 392 Lbs.	Time Available Fuel Will Last, Hrs.*	....	....	17.6	14.0	11.5	9.7	8.4	7.3	6.4	5.7	5.0	....	....	....
	Overall Efficiency of Boiler, %	....	....	69.0	68.5	67.5	66.6	65.5	64.0	62.5	61.0	59.0	....	....	....
	Stack Gas Temperature, °F	....	....	420	480	540	590	650	700	760	810	880	....	....	....
	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	....	....	3.1	3.9	4.7	5.6	6.4	7.4	8.4	9.5	10.8	....	....	....
	Draft Required, Ins. of Water	....	....	0.05	0.06	0.07	0.09	0.10	0.12	0.14	0.18	0.18	....	....	....
	Chimney Size, Ins.	....	....	16x16	16x16	16x16	16x16	16x16	16x16	16x16	16x16	16x16	....	....	....
	Chimney Height, Ft.	....	....	40	40	40	40	40	40	40	40	40	....	....	....

*Based on fuel of 12,500 B.t.u. per lb. For economical operation, add piping tax to Direct Radiation Load (Equivalent Direct Radiation); then select boiler from figures enclosed by heavy lines. For further explanation on boiler selection, see page A9. For guarantee see page A7.

29-INCH IDEAL WATER TUBE BOILER—Performance Data—Steam and Water

Number of Boiler	Output in Equivalent Direct Radiation (Sq. Ft.) Steam (240 B.t.u.) Water (150 B.t.u.)	800 1280	1000 1600	1200 1920	1400 2240	1600 2560	1800 2880	2000 3200	2200 3520	2400 3840	2600 4160	2800 4480	3000 4800	3200 5120	3400 5440	3600 5760
	Output in (1000's) B.t.u. per Hr.	192	240	288	336	384	432	480	528	576	624	672	720	768	816	864
S-2908 **W-2908** Grate Area 8.47 Sq. Ft. Fuel Cap. 611 Lbs. Available Fuel 458 Lbs.	Time Available Fuel Will Last, Hrs.*	20.8	16.6	13.7	11.6	10.1	8.8	7.8	6.9	6.2	5.6	5.0	...	...	...	...
	Overall Efficiency of Boiler, %	69.8	69.5	69.0	68.2	67.5	66.2	65.0	63.8	62.0	60.5	59.0	...	...	...	...
	Stack Gas Temperature, °F	390	440	490	540	590	640	690	740	790	840	890	...	...	...	...
	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	2.6	3.3	3.9	4.7	5.4	6.2	6.9	7.8	8.7	9.7	10.8	...	...	...	...
	Draft Required, Ins. of Water	0.04	0.05	0.06	0.07	0.08	0.10	0.11	0.13	0.15	0.17	0.20	...	...	...	...
	Chimney Size, Ins.	16x16	16x16	16x16	16x16	16x16	16x16	16x16	16x16	16x16	16x16	16x16	...	...	...	...
	Chimney Height, Ft.	45	45	45	45	45	45	45	45	45	45	45	...	...	...	...
S-2909 **W-2909** Grate Area 9.68 Sq. Ft. Fuel Cap. 699 Lbs. Available Fuel 524 Lbs.	Time Available Fuel Will Last, Hrs.*	...	19.5	16.1	13.8	12.0	10.5	9.3	8.3	7.5	6.8	6.1	5.6	5.0	...	...
	Overall Efficiency of Boiler, %	...	71.5	71.0	70.8	70.0	69.2	68.0	67.0	66.0	64.5	63.0	61.0	59.0	...	...
	Stack Gas Temperature, °F	...	410	450	500	540	580	620	670	710	750	800	840	880	...	...
	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	...	2.8	3.4	3.9	4.5	5.2	5.8	6.5	7.2	8.0	8.9	9.7	10.8	...	...
	Draft Required, Ins. of Water	...	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.12	0.13	0.16	0.18	0.20	...	...
	Chimney Size, Ins.	...	16x20	16x20	16x20	16x20	16x20	16x20	16x20	16x20	16x20	16x20	16x20	16x20	...	...
	Chimney Height, Ft.	...	50	50	50	50	50	50	50	50	50	50	50	50	..	...
S-2910 **W-2910** Grate Area 10.89 Sq. Ft. Fuel Cap. 787 Lbs. Available Fuel 590 Lbs.	Time Available Fuel Will Last, Hrs.*	...	22.7	19.0	16.2	14.0	12.4	11.0	9.8	8.8	8.0	7.2	6.6	6.0	5.5	5.0
	Overall Efficiency of Boiler, %	...	74.0	74.0	73.6	73.0	72.5	71.5	70.5	69.0	67.5	66.0	64.0	62.5	60.5	58.5
	Stack Gas Temperature, °F	...	370	410	440	480	520	560	590	630	660	700	740	770	800	840
	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	...	2.4	2.9	3.3	3.9	4.4	4.9	5.5	6.2	6.8	7.5	8.2	9.0	9.9	10.8
	Draft Required, Ins. of Water	...	0.03	0.04	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.12	0.13	0.15	0.18	0.21
	Chimney Size, Ins.	...	16x20	16x20	16x20	16x20	16x20	16x20	16x20	16x20	16x20	16x20	16x20	16x20	16x20	16x20
	Chimney Height, Ft.	...	55	55	55	55	55	55	55	55	55	55	55	55	55	55

36-INCH IDEAL WATER TUBE BOILER—Performance Data—Steam and Water

Number of Boiler	Output in Equivalent Direct Radiation (Sq. Ft.) Steam (240 B.t.u.)	875	1200	1525	1850	2175	2500	2825	3150	3475	3800	4125	4450	4775	5100	5425
	Water (150 B.t.u.)	1400	1920	2440	2960	3480	4000	4520	5040	5560	6080	6600	7120	7640	8160	8680
	Output in (1000's) B.t.u. per Hr	210	288	366	444	522	600	678	756	834	912	990	1068	1146	1224	1302
S-3606 **W-3606** Grate Area 7.50 Sq. Ft. Fuel Cap. 684 Lbs. Available Fuel 513 Lbs.	Time Available Fuel Will Last, Hrs.*	22.6	16.2	12.5	10.1	8.4	7.2	6.2	5.4	...	...	...	...	...	...	...
	Overall Efficiency of Boiler, %	74.0	72.9	71.5	70.0	68.5	67.5	65.5	64.0	...	...	...	...	...	...	...
	Stack Gas Temperature, °F	300	410	510	600	680	750	815	865	...	...	...	...	...	...	...
	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs	3.0	4.2	5.5	6.8	8.1	9.5	11.0	12.7	...	...	...	...	...	...	...
	Draft Required, Ins. of Water	.03	.04	.06	.08	.10	.13	.16	.19	...	...	...	...	...	...	...
	Chimney Size, Ins	16x20	16x20	16x20	16x20	16x20	16x20	16x20	16x20	...	...	...	...	...	...	...
	Chimney Height, Ft	45	45	45	45	45	45	45	45	...	...	...	...	...	...	...
S-3607 **W-3607** Grate Area 9.00 Sq. Ft. Fuel Cap. 828 Lbs. Available Fuel 621 Lbs.	Time Available Fuel Will Last, Hrs.*	...	19.8	15.4	12.5	10.4	8.9	7.8	6.8	6.1	5.4	...	...	...	...	...
	Overall Efficiency of Boiler, %	...	73.5	72.5	71.5	70.1	69.0	68.0	66.5	65.0	63.5	...	...	...	...	...
	Stack Gas Temperature, °F	...	350	430	515	590	660	725	780	830	870	...	...	...	...	...
	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs	...	3.5	4.5	5.5	6.6	7.8	8.9	10.1	11.3	12.8	...	...	...	...	...
	Draft Required, Ins. of Water	...	.03	.04	.06	.07	.10	.12	.14	.17	.20	...	...	...	...	...
	Chimney Size, Ins	...	16x20	16x20	16x20	16x20	16x20	16x20	16x20	16x20	16x20	...	...	...	...	...
	Chimney Height, Ft	...	50	50	50	50	50	50	50	50	50	...	...	...	...	...
S-3608 **W-3608** Grate Area 10.50 Sq. Ft. Fuel Cap. 972 Lbs. Available Fuel 729 Lbs.	Time Available Fuel Will Last, Hrs.*	...	23.4	18.3	14.9	12.5	10.7	9.4	8.3	7.4	6.7	6.0	5.4	...	...	...
	Overall Efficiency of Boiler, %	...	74.0	73.5	72.5	71.5	70.5	69.5	68.5	67.5	66.5	65.0	63.5	...	...	...
	Stack Gas Temperature, °F	...	310	380	455	530	595	650	710	760	810	840	875	...	...	...
	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs	...	3.0	3.8	4.7	5.6	6.5	7.4	8.4	9.4	10.4	11.6	12.9	...	...	...
	Draft Required, Ins. of Water	...	.03	.04	.05	.06	.08	.10	.12	.14	.16	.19	.21	...	...	...
	Chimney Size, Ins	...	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	...	...	...
	Chimney Height, Ft	...	50	50	50	50	50	50	50	50	50	50	50	...	...	...

*Based on fuel of 12,500 B.t.u. per lb. For economical operation, add piping tax to Direct Radiation Load (Equivalent Direct Radiation); then select boiler from figures enclosed by heavy lines. For further explanation on boiler selection, see page A9. For guarantee, see page A7.

36-INCH IDEAL WATER TUBE BOILER—Performance Data—Steam and Water

Number of Boiler	Output in Equivalent Direct Radiation (Sq. Ft.)																				
	Steam (240 B.t.u.)	1525	1850	2175	2500	2825	3150	3475	3800	4125	4450	4775	5100	5425	5750	6075	6400	6725	7050	7375	7700
	Water (150 B.t.u.)	2440	2960	3480	4000	4520	5040	5560	6080	6600	7120	7640	8160	8680	9200	9720	10240	10760	11280	11800	12320
	Output in (1000's) B.t.u. per Hr.	366	444	522	600	678	756	834	912	990	1068	1146	1224	1302	1380	1458	1536	1614	1692	1770	1848
S-3609 W-3609	Time Available Fuel Will Last, Hrs.*	21.1	17.2	14.5	12.5	10.9	9.6	8.6	7.8	7.0	6.4	5.9	5.4	...	...	...	...	...	...	...	...
Grate Area 12.00 Sq. Ft.	Overall Efficiency of Boiler, %.	73.8	73.0	72.5	71.5	70.5	69.5	68.5	67.5	66.5	65.5	64.0	63.0	...	...	...	...	...	...	...	...
	Stack Gas Temperature, °F.	340	405	465	525	580	635	690	735	780	820	850	880	...	...	...	...	...	...	...	...
Fuel Cap. 1116 Lbs.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	3.3	4.1	4.8	5.6	6.4	7.3	8.1	8.9	10.0	10.9	11.8	12.9	...	...	...	...	...	...	...	...
	Draft Required, Ins. of Water.	.03	.04	.05	.06	.08	.10	.12	.14	.16	.18	.20	.22	...	...	...	...	...	...	...	...
Available Fuel 837 Lbs.	Chimney Size, Ins.	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	...	...	...	...	...	...	...	...
	Chimney Height, Ft.	55	55	55	55	55	55	55	55	55	55	55	55	...	...	...	...	...	...	...	...
S-3610 W-3610	Time Available Fuel Will Last, Hrs.*	...	19.6	16.5	14.3	12.4	11.1	9.9	9.0	8.1	7.4	6.8	6.3	5.8	5.4	...	...	...	...	...	...
Grate Area 13.50 Sq. Ft.	Overall Efficiency of Boiler, %.	...	73.5	73.0	72.5	71.5	71.0	70.0	69.1	68.0	67.0	66.0	65.0	63.5	62.5	...	...	...	...	...	...
	Stack Gas Temperature, °F.	...	375	430	485	540	595	640	690	730	770	800	835	860	885	...	...	...	...	...	...
Fuel Cap. 1260 Lbs.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	...	3.6	4.2	4.9	5.6	6.3	7.1	7.8	8.6	9.5	10.3	11.1	12.1	13.0	...	...	...	...	...	...
	Draft Required, Ins. of Water.	...	.03	.04	.06	.07	.09	.10	.12	.14	.16	.18	.20	.22	.24	...	...	...	...	...	...
Available Fuel 945 Lbs.	Chimney Size, Ins.	...	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	...	...	...	...	...	...
	Chimney Height, Ft.	...	55	55	55	55	55	55	55	55	55	55	55	55	55	...	...	...	...	...	..
S-3611 W-3611	Time Available Fuel Will Last, Hrs.*	...	21.9	18.5	16.0	14.0	12.5	11.2	10.2	9.3	8.5	7.8	7.2	6.6	6.2	5.7	5.4	...	...	...	...
Grate Area 15.00 Sq. Ft.	Overall Efficiency of Boiler, %.	...	74.0	73.5	73.0	72.3	71.5	71.0	70.5	69.5	68.5	67.5	66.5	65.5	64.5	63.5	62.5	...	...	...	...
	Stack Gas Temperature, °F.	...	340	390	440	490	535	580	625	670	710	750	780	820	845	870	890	...	...	...	...
Fuel Cap. 1404 Lbs.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	...	3.2	3.8	4.4	5.0	5.6	6.3	6.9	7.6	8.3	9.0	9.8	10.6	11.3	12.3	13.0	...	...	...	...
	Draft Required, Ins. of Water.	...	.03	.04	.05	.06	.07	.09	.10	.12	.14	.15	.17	.19	.21	.23	.25	...	...	...	...
Available Fuel	Chimney Size, Ins.	...	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	20x20	...	...	...	...
			60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	...	...	...	...

36-INCH IDEAL WATER TUBE BOILER—Performance Data—Steam and Water

36-INCH IDEAL WATER TUBE BOILER—Performance Data—Steam and Water

Number of Boiler	Output in Equivalent Direct Radiation (Sq. Ft.)																				
	Steam (240 B.t.u.)........	1525	1850	2175	2500	2825	3150	3475	3800	4125	4450	4775	5100	5425	5750	6075	6400	6725	7050	7375	7700
	Water (150 B.t.u.)........	2440	2960	3480	4000	4520	5040	5560	6080	6600	7120	7640	8160	8680	9200	9720	10240	10760	11280	11800	12320
	Output in (1000's) B.t.u. per Hr.	366	444	522	600	678	756	834	912	990	1068	1146	1224	1302	1380	1458	1536	1614	1692	1770	1848
S-3612 **W-3612**	Time Available Fuel Will Last, Hrs.*............	...	...	20.4	17.6	15.5	13.8	12.4	11.3	10.3	9.4	8.7	8.1	7.5	7.0	6.5	6.1	5.7	5.4	...	...
Grate Area 16.50 Sq. Ft.	Overall Efficiency of Boiler, %..................	...	...	73.5	73.0	72.5	72.0	71.5	71.0	70.5	69.5	68.5	68.0	67.5	66.5	65.5	64.5	63.5	62.5	...	...
	Stack Gas Temperature, °F.	...	...	360	405	450	495	540	580	620	660	700	735	770	800	830	860	880	895	...	...
Fuel Cap. 1548 Lbs.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs......	...	...	3.5	4.0	4.5	5.1	5.7	6.2	6.8	7.5	8.1	8.7	9.4	10.1	10.8	11.5	12.3	13.0	...	...
AvailableFuel 1161 Lbs.	Draft Required, Ins. of Water	...	...	.03	.04	.05	.06	.07	.09	.10	.12	.13	.15	.17	.18	.20	.22	.24	.25	...	...
	Chimney Size, Ins........	...	...	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	...	...
	Chimney Height, Ft......	...	...	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	...	...
S-3613 **W-3613**	Time Available Fuel Will Last, Hrs.*............	...	...	...	19.4	17.0	15.2	13.7	12.4	11.4	10.5	9.7	8.9	8.3	7.8	7.3	6.9	6.4	6.0	5.7	5.4
Grate Area 18.00 Sq. Ft.	Overall Efficiency of Boiler, %..................	...	...	...	73.5	72.7	72.5	72.0	71.5	71.0	70.5	69.7	69.0	68.5	67.5	67.0	66.5	65.5	64.5	64.0	63.0
	Stack Gas Temperature, °F.	...	...	...	380	420	465	510	550	585	625	660	700	730	770	800	825	850	870	890	900
Fuel Cap. 1692 Lbs.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs......	...	...	...	3.6	4.1	4.6	5.1	5.7	6.2	6.7	7.3	7.9	8.5	9.0	9.7	10.2	11.0	11.7	12.4	13.0
AvailableFuel 1269 Lbs.	Draft Required, Ins. of Water	...	...	...	.04	.05	.06	.07	.08	.09	.10	.12	.13	.15	.17	.18	.20	.22	.23	.25	.27
	Chimney Size, Ins........	...	...	...	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24
	Chimney Height, Ft......	...	...	...	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65

*Based on fuel of 12,500 B.t.u. per lb. For economical operation, add piping tax to Direct Radiation Load (Equivalent Direct Radiation); then select boiler from figures enclosed by heavy lines. For further explanation on boiler selection, see page A9. For guarantee, see page A7.

36-INCH IDEAL WATER TUBE BOILER—Performance Data—Steam and Water

Number of Boiler	Output in Equivalent Direct Radiation (Sq. Ft.)																					
	Steam (240 B.t.u.).........	**2500**	**2825**	**3150**	**3475**	**3800**	**4125**	**4450**	**4775**	**5100**	**5425**	**5750**	**6075**	**6400**	**6725**	**7050**	**7375**	**7700**	**8025**	**8350**	**8675**	**9000**
	Water (150 B.t.u.).........	**4000**	**4520**	**5040**	**5560**	**6080**	**6600**	**7120**	**7640**	**8160**	**8680**	**9200**	**9720**	**10240**	**10760**	**11280**	**11800**	**12320**	**12840**	**13360**	**13880**	**14400**
	Output in (1000's) B.t.u. per Hr.	**600**	**678**	**756**	**834**	**912**	**990**	**1068**	**1146**	**1224**	**1302**	**1380**	**1458**	**1536**	**1614**	**1692**	**1770**	**1848**	**1926**	**2004**	**2082**	**2160**
S-3614 **W-3614**	Time Available Fuel Will Last, Hrs.*............	21.1	18.7	16.7	15.1	13.6	12.4	11.5	10.6	9.8	9.2	8.6	8.1	7.6	7.1	6.7	6.3	6.0	5.7	5.4	...	...
Grate Area	Overall Efficiency of Boiler, %..................	73.7	73.5	73.3	73.0	72.3	71.7	71.5	70.7	70.0	69.5	68.7	68.3	67.5	66.7	66.0	65.3	64.5	63.5	63.0	...	...
19.50 Sq. Ft.	Stack Gas Temperature, °F.	355	400	435	480	515	550	585	620	660	690	725	750	785	810	835	860	880	890	905	...	...
Fuel Cap.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.......	3.3	3.8	4.2	4.7	5.2	5.7	6.1	6.7	7.2	7.7	8.2	8.7	9.3	9.9	10.5	11.2	11.8	12.4	13.1	...	...
1836 Lbs.	Draft Required, Ins. of Water	.03	.04	.05	.06	.07	.08	.09	.11	.12	.14	.15	.17	.18	.20	.21	.23	.25	.27	.28	...	...
Available Fuel	Chimney Size, Ins..........	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	20x24	...	...
1377 Lbs.	Chimney Height, Ft.......	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	...	...
S-3615 **W-3615**	Time Available Fuel Will Last, Hrs.*............	...	...	18.0	16.3	14.9	13.6	12.5	11.6	10.7	10.0	9.3	8.8	8.3	7.8	7.3	7.0	6.6	6.3	5.9	5.6	5.4
Grate Area	Overall Efficiency of Boiler, %..................	...	...	73.5	73.3	73.0	72.5	72.0	71.5	70.7	70.3	69.5	69.0	68.5	67.7	67.0	66.5	65.5	65.0	64.0	63.3	62.5
21.00 Sq. Ft.	Stack Gas Temperature, °F.	...	...	410	440	480	510	550	580	615	650	680	710	740	770	795	820	845	865	885	900	910
Fuel Cap.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.......	...	...	3.9	4.3	4.7	5.2	5.7	6.1	6.6	7.1	7.6	8.0	8.5	9.1	9.7	10.1	10.7	11.2	12.0	12.6	13.1
1980 Lbs.	Draft Required, Ins. of Water	...	...	.04	.05	.06	.07	.08	.10	.11	.12	.14	.15	.17	.18	.20	.21	.22	.24	.26	.28	.30
Available Fuel	Chimney Size, Ins...... ...	...	...	24x24	24x24	24x24	24x24	24x24	24x24	24x24	24x24	24x24	24x24	24x24	24x24	24x24	24x24	24x24	24x24	24x24	24x24	24x24
1485 Lbs.	Chimney Height, Ft.......	...	...	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75

48-INCH IDEAL WATER TUBE BOILER—Performance Data—Steam and Water

Number of Boiler	Output in Equivalent Direct Radiation (Sq. Ft.)																					
	Steam (240 B.t.u.)........	2750	3375	4000	4625	5250	5875	6500	7125	7750	8375	9000	9625	10250	10875	11500	12125	12750	13375	14000	14625	15250
	Water (150 B.t.u.)........	4400	5400	6400	7400	8400	9400	10400	11400	12400	13400	14400	15400	16400	17400	18400	19400	20400	21400	22400	23400	24400
	Output in (1000's) B.t.u. per Hr.	660	810	960	1110	1260	1410	1560	1710	1860	2010	2160	2310	2460	2610	2760	2910	3060	3210	3360	3510	3660
S-4807 W-4807	Time Available Fuel Will Last, Hrs.*............	17.7	14.2	11.9	10.2	8.9	7.8	7.0	6.3	5.7	5.2	4.7	...	...	...	...	...	...	...	...	...	...
Grate Area 21.60 Sq. Ft.	Overall Efficiency of Boiler, %....................	70.5	69.5	68.7	68.0	67.5	66.5	65.5	64.5	63.5	62.5	61.5	...	...	...	...	...	...	...	...	...	...
	Stack Gas Temperature, °F.	370	420	470	510	560	610	660	710	750	800	850	...	...	...	...	...	...	...	...	...	...
Fuel Cap. 1770 Lbs.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs......	3.5	4.3	5.2	6.0	6.9	7.9	8.8	9.8	10.8	11.8	13.1	...	...	...	...	...	...	...	...	...	...
	Draft Required, Ins. of Water	0.05	0.08	0.10	0.12	0.16	0.20	0.25	0.28	0.32	0.40	0.44	...	...	...	...	...	...	...	...	...	...
Available Fuel 1328 Lbs.	Chimney Size, Ins........	24x24	24x24	24x24	24x24	24x24	24x24	24x24	24x24	24x24	24x24	24x24	...	...	...	...	...	...	...	...	...	...
	Chimney Height, Ft.......	70	70	70	70	70	70	70	70	70	70	70	...	...	...	...	...	...	...	...	...	...
S-4808 W-4808	Time Available Fuel Will Last, Hrs.*............	...	16.8	14.1	12.1	10.6	9.4	8.3	7.5	6.8	6.2	5.7	5.3	4.9	...	...	...	...	...	...	...	...
Grate Area 25.20 Sq. Ft.	Overall Efficiency of Boiler, %....................	...	70.5	70.0	69.5	69.0	68.5	67.0	66.5	65.5	64.5	63.5	63.0	62.0	...	...	...	...	...	...	...	...
	Stack Gas Temperature, °F.	...	380	430	460	510	550	590	630	670	710	760	800	840	...	...	...	...	...	...	...	...
Fuel Cap. 2065 Lbs.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs......	...	3.7	4.4	5.1	5.8	6.5	7.4	8.2	9.0	9.9	10.8	11.6	12.5	...	...	...	...	...	...	...	...
	Draft Required, Ins. of Water	...	0.05	0.08	0.10	0.12	0.13	0.16	0.20	0.25	0.30	0.35	0.40	0.45	...	...	...	...	...	...	...	...
Available Fuel 1549 Lbs.	Chimney Size, Ins........	...	24x24	24x24	24x24	24x24	24x24	24x24	24x24	24x24	24x24	24x24	24x24	24x24	...	...	...	...	...	...	...	...
	Chimney Height, Ft.......	...	75	75	75	75	75	75	75	75	75	75	75	75	...	...	...	...	...	...	...	...

*Based on fuel of 12,500 B.t.u. per lb. For economical operation, add piping tax to Direct Radiation Load (Equivalent Direct Radiation); then select boiler from figures enclosed by heavy lines. For further explanation on boiler selection, see page A9. For guarantee, see page A7.

48-INCH IDEAL WATER TUBE BOILER—Performance Data—Steam and Water

Number of Boiler	Output in Equivalent Direct Radiation (Sq. Ft.)																				
	Steam (240 B.t.u.)	3375	4000	4625	5250	5875	6500	7125	7750	8375	9000	9625	10250	10875	11500	12125	12750	13375	14000	14625	15250
	Water (150 B.t.u.)	5400	6400	7400	8400	9400	10400	11400	12400	13400	14400	15400	16400	17400	18400	19400	20400	21400	22400	23400	24400
	Output in (1000's) B.t.u. per Hr.	8	960	1110	1260	1410	1560	1710	1860	2010	2160	2310	2460	2610	2760	2910	3060	3210	3360	3510	3660
S-4809 **W-4809**	Time Available Fuel Will Last, Hrs.*...........	16.9	14.2	12.2	10.7	9.4	8.4	7.6	6.9	6.4	5.8	5.4	5.0	4.6	4.3	...	...	...	...	...	...
Grate Area	Overall Efficiency of Boiler, %..................	71.0	70.5	70.0	69.5	68.5	68 0	67.5	66.5	66.0	65.0	64.0	63.5	62.5	61.5	...	...	...	...	...	...
25.20 Sq. Ft.	Stack Gas Temperature, °F.	360	400	430	470	510	540	580	610	650	680	720	760	800	830	...	...	...	...	...	...
Fuel Cap.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.....	3.6	4.3	5.0	5.7	6.5	7.3	8.1	8.9	9.6	10.6	11.4	12.3	13.4	14.3	...	...	...	...	...	...
2065 Lbs.	DraftRequired,Ins.of Water	0.03	0.05	0.09	0.10	0.14	0.15	0.18	0.21	0.25	0.29	0.32	0.38	0.42	0.48	...	...	...	...	...	...
AvailableFuel	Chimney Size, Ins........	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	...	...	...	...	...	...
1549 Lbs.	Chimney Height, Ft.......	80	80	80	80	80	80	80	80	80	80	80	80	80	80	...	...	...	...	...	...
S-4810 **W-4810**	Time Available Fuel Will Last, Hrs.*...........	...	16.4	14.1	12.3	10.9	9.8	8.9	8.0	7.4	6.8	6.3	5.9	5.4	5.1	4.8	4.5	...	...	...	...
Grate Area	Overall Efficiency of Boiler, %..................	...	71.0	70.5	70.0	69.5	69.0	68.5	67.5	67.0	66.5	65.5	65.0	64.1	63.5	63.0	62.0	...	...	...	...
28.80 Sq. Ft.	Stack Gas Temperature, °F.	...	370	400	440	470	500	530	560	590	630	660	690	730	760	790	820	...	...	...	...
Fuel Cap.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.....	...	3.7	4.4	5.0	5.6	6.3	6.9	7.7	8.3	9.0	9.8	10.4	11.4	12.0	12.8	13.7	...	...	...	...
2360 Lbs.	DraftRequired,Ins.of Water	...	0.05	0.07	0 10	0.11	0.13	0.15	0.18	0.20	0.25	0.27	0.30	0.35	0.40	0.45	0.50	...	...	...	...
AvailableFuel	Chimney Size, Ins.......	...	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	...	...	...	...
1770 Lbs.	Chimney Height, Ft......	...	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	.	...	...	...

48-INCH IDEAL WATER TUBE BOILER—Performance Data—Steam and Water

Number of Boiler	Output in Equivalent Direct Radiation (Sq. Ft.)																				
	Steam (240 B.t.u.)........	3375	4000	4625	5250	5875	6500	7125	7750	8375	9000	9625	10250	10875	11500	12125	12750	13375	14000	14625	15250
	Water (150 B.t.u.)........	5400	6400	7400	8400	9400	10400	11400	12400	13400	14400	15400	16400	17400	18400	19400	20400	21400	22400	23400	24400
	Output in (1000's) B.t.u. per Hr.	810	960	1110	1260	1410	1560	1710	1860	2010	2160	2310	2460	2610	2760	2910	3060	3210	3360	3510	3660
S-4811 **W-4811**	Time Available Fuel Will Last, Hrs.*............	...	16.5	14.1	12.4	11.0	9.9	8.9	8.2	7.5	6.9	6.4	6.0	5.6	5.2	4.9	4.6	4.3	4.1	...	...
Grate Area 28.80 Sq. Ft.	Overall Efficiency of Boiler. %..................	...	71.5	71.0	70.5	70.0	69.5	69.0	68.5	68.0	67.5	66.6	66.3	65.5	64.5	64.0	63.5	62.5	62.0	...	...
	Stack Gas Temperature, °F.	...	350	380	410	440	470	490	520	550	580	610	640	670	700	730	760	790	810	...	...
Fuel Cap. 2360 Lbs.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs......	...	3.7	4.4	5.0	5.6	6.2	6.9	7.5	8.2	8.9	9.6	10.2	11.0	11.8	12.5	13.4	14.3	15.0	...	...
	DraftRequired,Ins.of Water	...	0.04	0.05	0.08	0.10	0.12	0.16	0.18	0.20	0.22	0.25	0.28	0.32	0.35	0.40	0.42	0.46	0.50	...	...
AvailableFuel 1770 Lbs.	Chimney Size, Ins........	...	28x28	28x28	28x28	28x28	28x28	28x28	28x28	28x28	28x28	28x28	28x28	28x28	28x28	28x28	28x28	28x28	28x28	...	...
	Chimney Height, Ft......	...	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	...
S-4812 **W-4812**	Time Available Fuel Will Last, Hrs.*...........	...	...	14.2	12.5	11.1	10.0	9.1	8.3	7.6	7.0	6.5	6.1	5.7	5.3	5.0	4.7	4.4	4.2	4.0	3.7
Grate Area 28.80 Sq. Ft.	Overall Efficiency of Boiler, %..................	...	...	71.5	71.1	70.8	70.5	70.0	69.5	69.0	68.5	67.7	67.3	66.6	66.1	65.5	64.7	64.0	63.5	63.0	62.0
	Stack Gas Temperature, °F.	...	...	360	390	410	440	470	490	520	550	570	600	630	650	680	700	730	760	780	810
Fuel Cap. 2360 Lbs.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs......	...	...	4.3	4.9	5.5	6.2	6.8	7.4	8.1	8.8	9.5	10.1	10.8	11.6	12.3	13.1	14.0	14.6	15.4	16.6
	DraftRequired,Ins.of Water	...	...	0.05	0.07	0.09	0.12	0.13	0.15	0.18	0.20	0.22	0.25	0.28	0.30	0.35	0.37	0.41	0.45	0.48	0.52
AvailableFuel 1770 Lbs.	Chimney Size, Ins........	...	...	28x28	28x28	28x28	28x28	28x28	28x28	28x28	28x28	28x28	28x28	28x28	28x28	28x28	28x28	28x28	28x28	28x28	28x28
	Chimney Height, Ft......	...	...	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

*Based on fuel of 12,500 B.t.u. per lb. For economical operation, add piping tax to Direct Radiation Load (Equivalent Direct Radiation); then select boiler from figures enclosed by heavy lines. For further explanation on boiler selection, see page A9. For guarantee see page A7.

48-INCH IDEAL WATER TUBE BOILER—Performance Data—Steam and Water

Number of Boiler	Output in Equivalent Direct Radiation (Sq. Ft.) Steam (240 B.t.u.)	5250	5875	6500	7125	7750	8375	9000	9625	10250	10875	11500	12125	12750	13375	14000	14625	15250	15875	16500	17125	17750
	Water (150 B.t.u.)	8400	9400	10400	11400	12400	13400	14400	15400	16400	17400	18400	19400	20400	21400	22400	23400	24400	25400	26400	27400	28400
	Output in (1000's) B.t.u. per Hr.	1260	1410	1560	1710	1860	2010	2160	2310	2460	2610	2760	2910	3060	3210	3360	3510	3660	3810	3960	4110	4260
S-4813 W-4813	Time Available Fuel Will Last, Hrs.*	14.2	12.6	11.3	10.3	9.4	8.6	8.0	7.4	6.9	6.5	6.1	5.7	5.4	5.1	4.8	4.6	4.3	4.1	3.9	...	...
	Overall Efficiency of Boiler, %	71.5	71.2	70.8	70.5	70.0	69.5	69.0	68.7	68.5	67.6	67.3	66.6	66.3	65.5	64.8	64.3	63.5	63.0	62.5	...	...
Grate Area 32.40 Sq. Ft.	Stack Gas Temperature, °F.	370	390	420	440	460	490	510	540	560	590	610	640	660	680	710	730	760	780	810	...	...
Fuel Cap. 2655 Lbs.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	4.3	4.9	5.4	6.0	6.5	7.2	7.7	8.3	8.9	9.5	10.1	10.8	11.4	12.0	12.8	13.4	14.3	15.0	15.8	...	...
Available Fuel 1991 Lbs.	Draft Required, Ins. of Water	0.06	0.08	0.10	0.11	0.12	0.13	0.16	0.18	0.21	0.23	0.25	0.29	0.32	0.35	0.39	0.42	0.46	0.50	0.55	...	...
	Chimney Size, Ins.	28x32	28x32	28x32	28x32	28x32	28x32	28x32	28x32	28x32	28x32	28x32	28x32	28x32	28x32	28x32	28x32	28x32	28x32	28x32	...	...
	Chimney Height, Ft.	105	105	105	105	105	105	105	105	105	105	105	105	105	105	105	105	105	105	105	...	...
S-4814 W-4814	Time Available Fuel Will Last, Hrs.*	14.2	12.7	11.4	10.4	9.5	8.7	8.1	7.5	7.0	6.6	6.2	5.8	5.5	5.2	4.9	4.7	4.4	4.2	4.0	3.8	3.7
	Overall Efficiency of Boiler, %	71.7	71.6	71.5	71.0	70.7	70.5	70.1	69.7	69.5	69.0	68.5	68.0	67.5	67.0	66.5	65.8	65.0	64.5	64.0	63.5	63.0
Grate Area 32.40 Sq. Ft.	Stack Gas Temperature, °F.	350	370	400	420	440	460	490	510	530	560	580	600	620	650	670	690	710	740	760	780	800
Fuel Cap. 2655 Lbs.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	4.3	4.8	5.4	5.9	6.5	7.1	7.6	8.2	8.8	9.3	9.9	10.6	11.2	11.8	12.5	13.1	14.0	14.6	15.4	16.2	16.6
Available Fuel 1991 Lbs.	Draft Required, Ins. of Water	0.05	0.06	0.08	0.09	0.10	0.11	0.13	0.15	0.18	0.20	0.21	0.23	0.26	0.29	0.32	0.35	0.40	0.43	0.48	0.51	0.57
	Chimney Size, Ins.	28x32	28x32	28x32	28x32	28x32	28x32	28x32	28x32	28x32	28x32	28x32	28x32	28x32	28x32	28x32	28x32	28x32	28x32	28x32	28x32	28x32
	Chimney Height,	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110

79-INCH IDEAL WATER TUBE BOILER—Performance Data—Steam and Water

Number of Boiler	Output in Equivalent Direct Radiation (Sq. Ft.) Steam (240 B.t.u.)	4000	5000	6000	7000	8000	9000	10000	11000	12000	13000	14000	15000	16000	17000	18000	19000	20000	21000	22000	23000	24000
	Water (150 B.t.u.)	6400	8000	9600	11200	12800	14400	16000	17600	19200	20800	22400	24000	25600	27200	28800	30400	32000	33600	35200	36800	38400
	Output in (1000's) B.t.u. per Hr.	960	1200	1440	1680	1920	2160	2400	2640	2880	3120	3360	3600	3840	4080	4320	4560	4800	5040	5280	5520	5760
S-7909 W-7909	Time Available Fuel Will Last, Hrs.*	17.8	14.4	12.0	10.2	8.8	7.7	6.8	6.1	5.4	4.9	4.4	...	...	...	...	...	...	...	...	...	...
Grate Area 21.9 Sq. Ft.	Overall Efficiency of Boiler, %	73.3	73.9	73.9	73.4	72.7	71.5	70.2	68.6	66.9	65.1	63.2	...	...	...	...	...	...	...	...	...	...
	Stack Gas Temperature, °F.	370	410	460	500	540	590	630	670	720	760	800	...	...	...	...	...	...	...	...	...	...
Fuel Cap. 2484 Lbs.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	4.8	5.9	7.1	8.3	9.5	11.0	12.5	14.1	15.7	17.5	19.4	...	...	...	...	...	...	...	...	...	...
	Draft Required, Ins. of Water.	0.16	0.20	0.25	0.30	0.35	0.40	0.46	0.51	0.58	0.64	0.73	...	...	...	...	...	...	...	...	...	...
Available Fuel 1863 Lbs.	Chimney Size, Ins.	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	...	...	...	...	...	...	...	...	...	...
	Chimney Height, Ft.	85	85	85	85	85	85	85	85	85	85	85	...	...	...	...	...	...	...	...	...	...
S-7910 W-7910	Time Available Fuel Will Last, Hrs.*	...	16.0	13.3	11.3	9.9	8.6	7.7	6.9	6.2	5.6	5.1	4.6	...	...	...	...	...	...	...	...	...
Grate Area 24.9 Sq. Ft.	Overall Efficiency of Boiler, %	...	74.1	74.1	73.7	73.3	72.2	71.3	70.0	68.8	67.3	65.8	64.2	...	...	...	...	...	...	...	...	...
	Stack Gas Temperature, °F.	...	390	430	470	510	550	590	630	670	700	740	780	...	...	...	...	...	...	...	...	...
Fuel Cap. 2760 Lbs.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	...	5.2	6.2	7.3	8.4	9.6	10.8	12.1	13.4	14.8	16.3	18.0	...	...	...	...	...	...	...	...	...
	Draft Required, Ins. of Water.	...	0.20	0.24	0.29	0.33	0.38	0.43	0.49	0.54	0.60	0.66	0.73	...	...	...	...	...	...	...	...	...
Available Fuel 2070 Lbs.	Chimney Size, Ins.	...	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	...	...	...	...	...	...	...	...	...
	Chimney Height, Ft.	...	90	90	90	90	90	90	90	90	90	90	90	...	...	...	...	...	...	...	...	...
S-7911 W-7911	Time Available Fuel Will Last, Hrs.*	...	17.6	14.7	12.5	11.0	9.6	8.6	7.7	6.9	6.3	5.7	5.2	4.8	4.4	...	...	...	...	...	...	...
Grate Area 28.0 Sq. Ft.	Overall Efficiency of Boiler, %	...	74.3	74.3	74.0	73.8	72.9	72.1	71.2	70.1	69.0	67.8	66.3	65.0	63.5	...	...	...	...	...	...	...
	Stack Gas Temperature, °F.	...	380	410	450	480	520	550	590	630	660	700	730	760	800	...	...	...	...	...	...	...
Fuel Cap. 3036 Lbs.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.	...	4.6	5.5	6.5	7.4	8.4	9.5	10.6	11.7	12.9	14.1	15.5	16.9	18.3	...	...	...	...	...	...	...
	Draft Required, Ins. of Water.	...	0.19	0.23	0.28	0.32	0.36	0.41	0.46	0.51	0.56	0.62	0.68	0.74	0.82	...	...	...	...	...	...	...
Available Fuel 2277 Lbs.	Chimney Size, Ins.	...	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	24x28	...	...	...	...	...	...	...
	Chimney Height, Ft.	...	95	95	95	95	95	95	95	95	95	95	95	95	95	...	...	...	...	...	...	...

*Based on fuel of 12,500 B. t. u. per lb. For economical operation, add piping tax to Direct Radiation Load (Equivalent Direct Radiation); then select boiler from figures enclosed by heavy lines. For further explanation on boiler selection, see page A9. For guarantee, see page A7.

79-INCH IDEAL WATER TUBE BOILER—Performance Data—Steam and Water

Number of Boiler	Output in Equivalent Direct Radiation (Sq. Ft.)																					
	Steam (240 B.t.u.)...........	6000	7000	8000	9000	10000	11000	12000	13000	14000	15000	16000	17000	18000	19000	20000	21000	22000	23000	24000	25000	26000
	Water (150 B.t.u.)...........	9600	11200	12800	14400	16000	17600	19200	20800	22400	24000	25600	27200	28800	30400	32000	33600	35200	36800	38400	40000	41600
	Output in (1000's) B.t.u. per Hr.	1440	1680	1920	2160	2400	2640	2880	3120	3360	3600	3840	4080	4320	4560	4800	5040	5280	5520	5760	6000	6240
S-7912 **W-7912**	Time Available Fuel Will Last, Hrs.*....................	16.1	13.7	12.0	10.6	9.4	8.5	7.7	7.0	6.4	5.9	5.4	5.0	4.6	...	...	...	...	...	...	...	...
Grate Area	Overall Efficiency of Boiler, %	74.5	74.3	74.1	73.4	72.8	72.2	71.3	70.3	69.3	68.2	67.1	65.9	64.6	...	...	...	...	...	...	...	...
31.1 Sq. Ft.	Stack Gas Temperature, °F...	390	430	460	490	530	560	590	630	660	690	720	760	790	...	...	...	...	...	...	...	...
Fuel Cap.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.........	5.0	5.8	6.7	7.5	8.4	9.4	10.4	11.4	12.5	13.6	14.7	15.9	17.2	...	...	...	...	...	...	...	...
3312 Lbs.	Draft Required, Ins. of Water.	0.22	0.26	0.30	0.34	0.39	0.43	0.48	0.53	0.58	0.63	0.69	0.75	0.82	...	...	...	...	...	...	...	...
Available Fuel	Chimney Size, Ins...........	28x28	28x28	28x28	28x28	28x28	28x28	28x28	28x28	28x28	28x28	28x28	28x28	28x28	...	...	...	...	...	...	...	...
2484 Lbs.	Chimney Height, Ft.........	100	100	100	100	100	100	100	100	100	100	100	100	100	...	...	...	...	...	...	...	...
S-7913 **W-7913**	Time Available Fuel Will Last, Hrs.*....................	17.5	14.9	13.0	11.5	10.3	9.3	8.4	7.7	7.0	6.4	6.0	5.6	5.2	4.8	...	...	...	...	...	...	...
Grate Area	Overall Efficiency of Boiler, %	74.7	74.5	74.3	73.9	73.3	72.8	72.0	71.2	70.3	69.3	68.4	67.4	66.3	65.2	...	...	...	...	...	...	...
34.2 Sq. Ft.	Stack Gas Temperature, °F...	380	420	440	470	510	540	570	600	630	660	690	720	750	780	...	...	...	...	...	...	...
Fuel Cap.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.........	4.5	5.3	6.0	6.8	7.6	8.5	9.3	10.2	11.2	12.1	13.1	14.1	15.2	16.3	...	...	...	...	...	...	...
3588 Lbs.	Draft Required, Ins. of Water.	0.20	0.24	0.28	0.32	0.37	0.41	0.45	0.50	0.54	0.59	0.64	0.70	0.76	0.83	...	...	...	...	...	...	...
Available Fuel	Chimney Size, Ins...........	30x30	30x30	30x30	30x30	30x30	30x30	30x30	30x30	30x30	30x30	30x30	30x30	30x30	30x30	...	...	...	...	...	...	...
2691 Lbs.	Chimney Height, Ft.........	105	105	105	105	105	105	105	105	105	105	105	105	105	105	...	...	...	...	...	...	...
S-7914 **W-7914**	Time Available Fuel Will Last, Hrs.*....................	18.8	16.1	14.0	12.4	11.1	10.0	9.1	8.3	7.7	7.1	6.5	6.1	5.7	5.3	...	...	...	...	...	...	...
Grate Area	Overall Efficiency of Boiler, %	74.8	74.7	74.4	74.1	73.6	73.1	72.4	71.7	71.1	70.1	69.3	68.5	67.6	66.7	...	...	...	...	...	...	...
37.3 Sq. Ft.	Stack Gas Temperature, °F....	370	400	430	460	490	520	550	580	610	640	660	690	720	750	...	...	...	...	...	...	...
Fuel Cap.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.........	4.1	4.8	5.5	6.3	7.0	7.7	8.5	9.3	10.1	11.0	11.9	12.8	13.7	14.6	...	...	...	...	...	...	...
3864 Lbs.	Draft Required, Ins. of Water.	0.19	0.23	0.27	0.31	0.35	0.39	0.43	0.47	0.51	0.56	0.61	0.66	0.71	0.78	...	...	...	...	...	...	...
Available Fuel	Chimney Size, Ins...........	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	...	...	...	...	...	...	...
2898 Lbs.	Chimney Height, Ft.........	110	110	110	110	110	110	110	110	110	110	110	110	110	110	...	...	...	...	...	...	...

2898 Lbs.	Chimney Height, Ft.........	110	110	110	110	110	110	110	110	110	110	110	110	110	110	...	...	...	...	...	...	...

79-INCH IDEAL WATER TUBE BOILER—Performance Data—Steam and Water

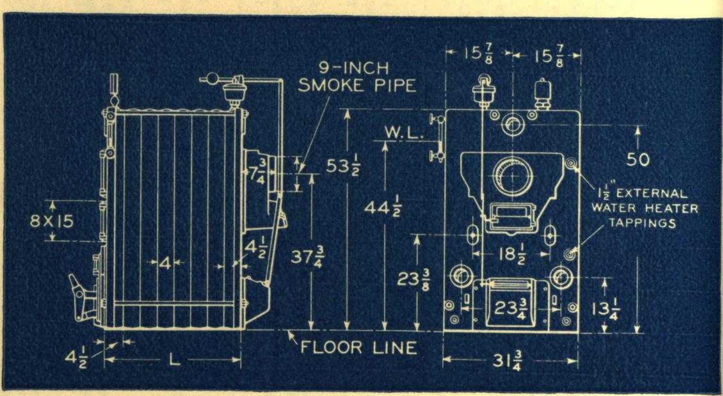
Number of Boiler	Output in Equivalent Direct Radiation (Sq. Ft.) Steam (240 B.t.u.)...........	6000	7000	8000	9000	10000	11000	12000	13000	14000	15000	16000	17000	18000	19000	20000	21000	22000	23000	24000	25000	26000
	Water (150 B.t.u.)...........	9600	11200	12800	14400	16000	17600	19200	20800	22400	24000	25600	27200	28800	30400	32000	33600	35200	36800	38400	40000	41600
	Output in (1000's) B.t.u. per Hr.	1440	1680	1920	2160	2400	2640	2880	3120	3360	3600	3840	4080	4320	4560	4800	5040	5280	5520	5760	6000	6240
S-7915 **W-7915**	Time Available Fuel Will Last, Hrs.*..................	..	...	12.6	11.1	10.0	9.0	8.2	7.5	6.9	6.4	5.9	5.5	5.1	4.8	4.5	4.2	4.0	3.7	...	...	...
Grate Area	Overall Efficiency of Boiler, %	...	...	74.6	74.3	73.9	73.4	72.8	72.2	71.6	70.7	70.0	69.2	68.4	67.6	66.6	65.8	64.9	63.9	...	...	...
34.2 Sq. Ft.	Stack Gas Temperature, °F...	...	...	420	450	480	510	540	570	600	630	650	680	710	740	770	800	830	860	...	...	...
Fuel Cap.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.........	....	..	6.0	6.8	7.6	8.4	9.2	10.1	11.0	11.9	12.8	13.8	14.8	15.8	16.9	17.9	19.0	20.2	...	...	..
3450 Lbs.	Draft Required, Ins. of Water.	...	...	0.26	0.29	0.33	0.37	0.41	0.45	0.49	0.53	0.58	0.62	0.67	0.73	0.78	0.84	0.90	0.98	...	...	...
Available Fuel	Chimney Size, Ins...........	...	...	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	30x36	...	...	...
2588 Lbs.	Chimney Height, Ft..........	..	...	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	...	...	...
S-7916 **W-7916**	Time Available Fuel Will Last, Hrs.*..................	...	...	12.6	11.2	10.0	9.0	8.2	7.5	6.9	6.4	6.0	5.6	5.2	4.9	4.6	4.3	4.1	3.8	3.6	...	...
Grate Area	Overall Efficiency of Boiler, %	...	..	74.7	74.5	74.2	73.7	73.2	72.6	72.1	71.3	70.6	69.9	69.2	68.4	67.6	66.8	65.9	65.1	64.2	...	...
34.2 Sq. Ft.	Stack Gas Temperature, °F...	...	..	410	440	460	490	520	550	570	600	630	660	680	710	740	760	790	820	840	...	...
Fuel Cap.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.........	...	..	6.0	6.8	7.6	8.4	9.2	10.1	10.9	11.8	12.7	13.6	14.6	15.6	16.6	17.6	18.7	19.8	21.0	...	...
3450 Lbs.	Draft Required, Ins. of Water.	..	.	0.24	0.28	0.31	0.35	0.39	0.42	0.46	0.51	0.55	0.59	0.64	0.69	0.74	0.80	0.86	0.92	1.00	...	...
Available Fuel	Chimney Size, Ins...........	..	...	36x36	36x36	36x36	36x36	36x36	36x36	36x36	36x36	36x36	36x36	36x36	36x36	36x36	36x36	36x36	36x36	36x36	...	..
2588 Lbs.	Chimney Height, Ft.........	...	...	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	...	...
S-7917 **W-7917**	Time Available Fuel Will Last, Hrs.*..................	..	..	13.6	12.1	10.8	9.8	8.9	8.2	7.6	7.0	6.5	6.1	5.7	5.3	5.0	4.7	4.4	4.2	4.0	3.8	3.6
Grate Area	Overall Efficiency of Boiler, %	..	.	74.8	74.7	74.4	74.0	73.7	73.1	72.6	72.0	71.3	70.6	70.0	69.2	68.6	67.8	67.0	66.3	65.4	64.6	63.9
37.3 Sq. Ft.	Stack Gas Temperature, °F...	...	..	400	420	450	470	500	520	540	570	600	620	650	670	700	720	750	770	800	820	850
Fuel Cap.	Fuel Burned per Sq. Ft. of Grate per Hr., Lbs.........	..	..	5.5	6.2	6.9	7.6	8.4	9.2	9.9	10.7	11.5	12.3	13.2	14.1	15.0	15.9	16.9	17.9	18.9	19.9	20.9
3726 Lbs.	Draft Required, Ins. of Water.	...	...	0.23	0.27	0.30	0.33	0.37	0.40	0.44	0.48	0.52	0.56	0.61	0.65	0.70	0.76	0.81	0.87	0.93	1.00	1.08
Available Fuel	Chimney Size, Ins...........	...	..	36x36	36x36	36x36	36x36	36x36	36x36	36x36	36x36	36x36	36x36	36x36	36x36	36x36	36x36	36x36	36x36	36x36	36x36	36x36
2795 Lbs.	Chimney Height, Ft.........	..	...	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125

*Based on fuel of 12,500 B. t. u. per lb. For economical operation, add piping tax to Direct Radiation Load (Equivalent Direct Radiation); then select boiler from figures enclosed by heavy lines. For further explanation on boiler selection, see page A9. For guarantee, see page A7.

23-Inch Ideal Water Tube Boiler—Steam and Water

ANTHRACITE

Dimensions—Outlets—Inlets



Number of Boiler		"L" Length Inches	Outlets Number and Size	Inlets Number and Size
Steam	Water			
S-2305	W-2305	21	1-4″	2-3″
S-2306	W-2306	25	1-4″	2-3″
S-2307	W-2307	29	1-4″	2-3″
S-2308	W-2308	33	1-4″	2-3″
S-2309	W-2309	37	1-4″	2-3″
S-2310	W-2310	41	1-4″	2-3″

ASSEMBLAGE OF SECTIONS

Number of Boiler		Assemblage
Steam	Water	
S-2305	W-2305	A-2C-U-H
S-2306	W-2306	A-3C-U-H
S-2307	W-2307	A-4C-U-H
S-2308	W-2308	A-5C-U-H
S-2309	W-2309	A-6C-U-H
S-2310	W-2310	A-7C-U-H

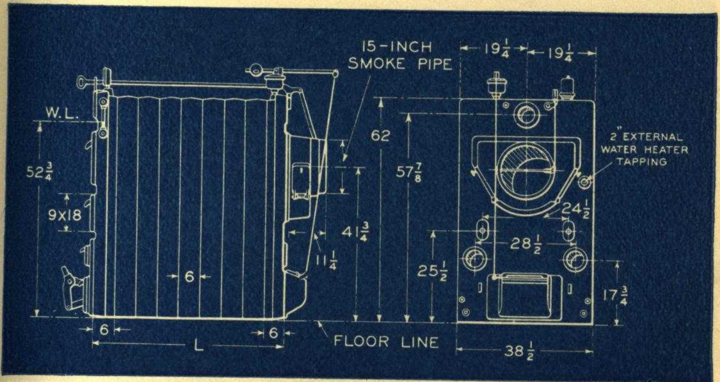
A = Front Section.
C = Center Section.

H = Back Section.
U = Rear Center (Uptake).

29-Inch Ideal Water Tube Boiler—Steam and Water

ANTHRACITE

Dimensions—Outlets—Inlets



Number of Boiler		"L" Length Inches	Steam		Water	
Steam	Water		Outlets Number and Size	Inlets Number and Size	Outlets Number and Size	Inlets Number and Size
S-2905	W-2905	30	1-5″	2-4″	1-5″	2-4″
S-2906	W-2906	36	1-5″	2-4″	1-5″	2-4″
S-2907	W-2907	42	1-5″	2-4″	2-5″	2-4″
S-2908	W-2908	48	1-5″	2-4″	2-5″	2-4″
S-2909	W-2909	54	2-5″	2-4″	2-5″	2-4″
S-2910	W-2910	60	2-5″	2-4″	2-5″	2-4″

ASSEMBLAGE OF SECTIONS

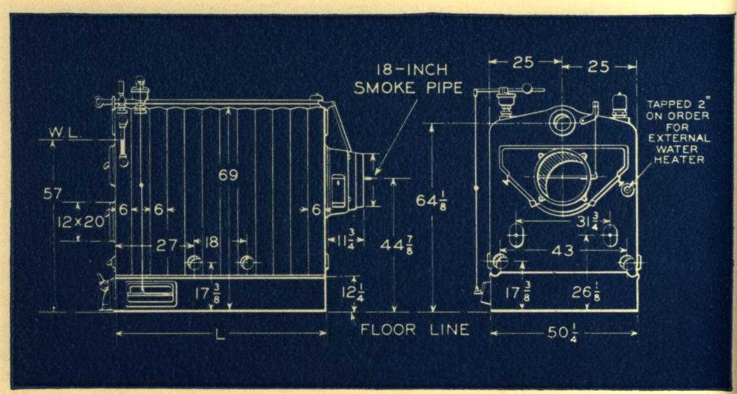
Number of Boiler		Assemblage
Steam	Water	
S-2905	W-2905	A-2C-U-H
S-2906	W-2906	A-3C-U-H
S-2907	W-2907	A-4C-U-H
S-2908	W-2908	A-5C-U-H
S-2909	W-2909	A-6C-U-H
S-2910	W-2910	A-7C-U-H

A = Front Section.
C = Center Section.
U = Rear Center (Uptake).
H = Back Section.

36-Inch Ideal Water Tube Boiler—Steam and Water

ANTHRACITE

Dimensions—Outlets—Inlets

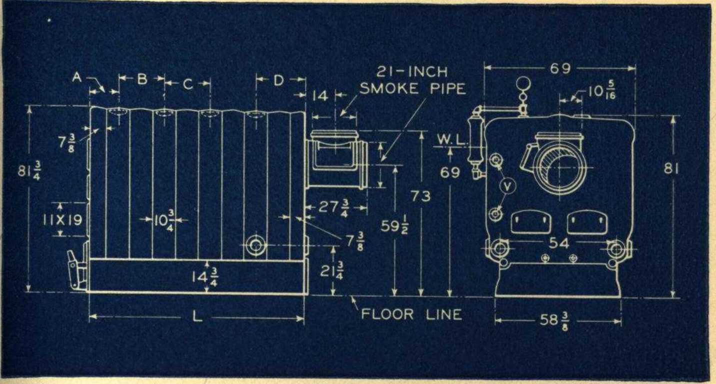


Number of Boiler		"L" Length Inches	Steam		Water	
Steam	Water		Outlets Number and Size	Inlets Number and Size	Outlets Number and Size	Inlets Number and Size
S-3606	W-3606	36	1-6″	2-4″	1-6″	2-4″
S-3607	W-3607	42	2-6″	2-4″	2-6″	2-3½″ & 2-4″
S-3608	W-3608	48	2-6″	2-4″	2-6″	2-3½″ & 2-4″
S-3609	W-3609	54	2-6″	2-4″	2-6″	2-3½″ & 2-4″
S-3610	W-3610	60	2-6″	2-4″	2-6″	2-3½″ & 2-4″
S-3611	W-3611	66	2-6″	2-4″	2-6″	2-3½″ & 2-4″
S-3612	W-3612	72	2-6″	2-4″	2-6″	4-3½″ & 2-4″
S-3613	W-3613	78	2-6″	2-4″	2-6″	4-3½″ & 2-4″
S-3614	W-3614	84	2-6″	2-4″	2-6″	4-3½″ & 2-4″
S-3615	W-3615	90	2-6″	2-4″	2-6″	4-3½″ & 2-4″

Number of Boiler	Assemblage Steam	Number of Boiler	Assemblage Water
S-3606	A-3C-U-H	W-3606	A-3C-U-H
S-3607	A-4C-U-H	W-3607	A-3C-D-U-H
S-3608	A-5C-U-H	W-3608	A-3C-D-C-U-H
S-3609	A-6C-U-H	W-3609	A-3C-D-2C-U-H
S-3610	A-7C-U-H	W-3610	A-3C-D-3C-U-H
S-3611	A-8C-U-H	W-3611	A-3C-D-4C-U-H
S-3612	A-B-8C-U-H	W-3612	A-B-2C-D-2C-D-2C-U-H
S-3613	A-B-8C-2U-H	W-3613	A-B-2C-D-2C-D-2C-2U-H
S-3614	A-B-9C-2U-H	W-3614	A-B-2C-D-2C-D-3C-2U-H
S-3615	A-B-10C-2U-H	W-3615	A-B-2C-D-2C-D-4C-2U-H

A = Front Section.
C = Center Section.
D = Center Connecting Section.
U = Rear Center Uptake Section.
H = Back Section.

48-Inch Ideal Water Boiler—Steam and Water
ANTHRACITE
Dimensions—Outlets—Inlets



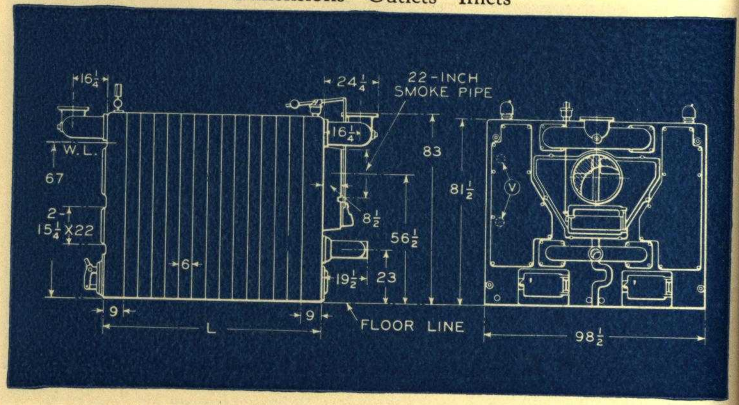
TAPPED 3″ ON ORDER FOR EXTERNAL WATER HEATER AT POINTS V

Number of Boiler		"L" Lgth. Ins.	Steam		Water		Boiler Outlets			
Steam	Water		Outlets Number and Size	Inlets Number and Size	Outlets Number and Size	Inlets Number and Size	A	B	C	D
S-4807	W-4807	68½	3-6″	4-4″	3-6″	4-6″	12¾″	21½″	.....	12¾″
S-4808	W-4808	79¼	3-6″	4-4″	3-6″	4-6″	12¾″	32¼″	.....	12¾″
S-4809	W-4809	90	3-6″	4-4″	3-6″	4-6″	12¾″	32¼″	.....	23½″
S-4810	W-4810	100¾	3-6″	4-4″	3-6″	4-6″	12¾″	32¼″	.....	23½″
S-4811	W-4811	111½	4-6″	4-4″	4-6″	4-6″	12¾″	21½″	21½″	23½″
S-4812	W-4812	122¼	4-6″	4-4″	4-6″	4-6″	12¾″	21½″	32¼″	23½″
S-4813	W-4813	133	4-6″	4-4″	4-6″	4-6″	12¾″	32¼″	32¼″	23½″
S-4814	W-4814	143¾	4-6″	4-4″	4-6″	4-6″	12¾″	32¼″	32¼″	23½″

Number of Boiler		Assemblage	
Steam	Water	Left Half	Right Half
S-4807	W-4807	A-CX-F-NX-F-GX-1	A-K-F-F-F-MX-1
S-4808	W-4808	A-CX-F-F-NX-F-GX-U-1	A-K-F-F-F-F-MX-1
S-4809	W-4809	A-CX-F-F-NX-F-F-GX-U-1	A-K-F-F-F-F-MX-U-1
S-4810	W-4810	A-CX-F-F-NX-F-F-GX-U-1	A-K-F-F-F-F-F-MX-U-1
S-4811	W-4811	A-CX-F-NX-F-NX-F-F-GX-U-1	A-K-F-F-F-F-F-F-MX-U-1
S-4812	W-4812	A-CX-F-NX-F-F-NX-F-U-GX-U-1	A-K-F-F-F-F-F-F-U-MX-U-1
S-4813	W-4813	A-CX-F-F-NX-F-F-NX-F-U-GX-U-1	A-K-F-F-F-F-F-F-F-U-MX-U-1
S-4814	W-4814	A-CX-F-F-NX-F-F-NX-F-F-U-GX-U-1	A-K-F-F-F-F-F-F-F-F-U-MX-U-1

A = Front Section.
K = Closed Front Flue.
CX = Closed Front Flue Connecting (Supply Only).
F = Closed Center Section.
NX = Closed Center Connecting (Supply Only).
U = Open Rear Center.
MX = Open Rear Center Connecting (Return Only).
GX = Open Rear Center Connecting (Supply and Return).
I = Open Back.

79-Inch Ideal Water Tube Boiler—Steam and Water
ANTHRACITE
Dimensions—Outlets—Inlets



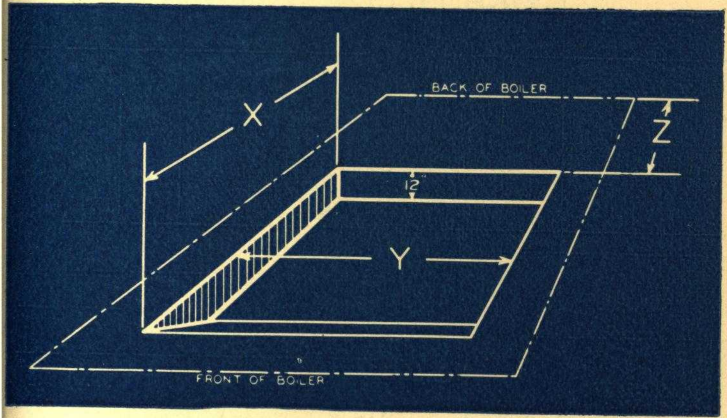
TAPPED 3″ ON ORDER FOR EXTERNAL WATER HEATER AT POINTS V

Number of Boiler		"L" Length Inches	Steam		Water	
Steam	Water		Outlets Number and Size	Inlets Number and Size	Outlets Number and Size	Inlets Number and Size
S-7909	W-7909	60	1-10″	1-4″	1-10″	2-10″
S-7910	W-7910	66	1-10″	1-4″	1-10″	2-10″
S-7911	W-7911	72	2-10″	1-4″	2-10″	2-10″
S-7912	W-7912	78	2-10″	1-4″	2-10″	2-10″
S-7913	W-7913	84	2-10″	1-4″	2-10″	2-10″
S-7914	W-7914	90	2-10″	1-4″	2-10″	2-10″
S-7915	W-7915	96	2-10″	1-4″	2-10″	2-10″
S-7916	W-7916	102	2-10″	1-4″	2-10″	2-10″
S-7917	W-7917	108	2-10″	1-4″	2-10″	2-10″

Number of Boiler		Assemblage
Steam	Water	
S-7909	W-7909	A-7C-H
S-7910	W-7910	A-8C-H
S-7911	W-7911	A-9C-H
S-7912	W-7912	A-10C-H
S-7913	W-7913	A-11C-H
S-7914	W-7914	A-12C-H
S-7915	W-7915	A-11C-BW-G-H
S-7916	W-7916	A-FC-10C-BW-2G-H
S-7917	W-7917	A-FC-11C-BW-2G-H

A = Front Section.
C = Center Section.
BW = Bridgewall Section.
G = Open Center Section.
H = Back Section.

Ideal Water Tube Boiler
Ash Pit Dimensions



29″ Ideal Water Tube Boiler

Number of Boiler	Dimensions in Inches			
	Depth	"X"	"Y"	"Z"
S or W-2905	12	24	23	3
S or W-2906	12	30	23	3
S or W-2907	12	36	23	3
S or W-2908	12	42	23	3
S or W-2909	12	48	23	3
S or W-2910	12	54	23	3

36″ Ideal Water Tube Boiler

Number of Boiler	Dimensions in Inches			
	Depth	"X"	"Y"	"Z"
S or W-3606	12	30	42	3
S or W-3607	12	36	42	3
S or W-3608	12	42	42	3
S or W-3609	12	48	42	3
S or W-3610	12	54	42	3
S or W-3611	12	60	42	3
S or W-3612	12	66	42	3
S or W-3613	12	72	42	3
S or W-3614	12	78	42	3
S or W-3615	12	84	42	3

48″ Ideal Water Tube Boiler

Number of Boiler	Dimensions in Inches			
	Depth	"X"	"Y"	"Z"
S or W-4807	12	63	50	2
S or W-4808	12	73	50	2
S or W-4809	12	73	50	14
S or W-4810	12	83	50	14
S or W-4811	12	83	50	24
S or W-4812	12	83	50	35
S or W-4813	12	94	50	35
S or W-4814	12	94	50	46

79″ Ideal Water Tube Boiler

Number of Boiler	Dimensions in Inches			
	Depth	"X"	"Y"	"Z"
S or W-7909	12	43	74	8
S or W-7910	12	49	74	8
S or W-7911	12	55	74	8
S or W-7912	12	61	74	8
S or W-7913	12	67	74	8
S or W-7914	12	73	74	8
S or W-7915	12	67	74	20
S or W-7916	12	73	74	20
S or W-7917	12	73	74	26

Arrangement of Grate Bars
Ideal Water Tube Boilers

Boiler Number	Left Front	Right Rear
S or W-2305	3	. . .
S or W-2306	4	. . .
S or W-2307	3	2
S or W-2308	3	3
S or W-2309	4	3
S or W-2310	4	4

Boiler Number	Left Front	Right Rear
S or W-2905	3	. . .
S or W-2906	2	2
S or W-2907	3	2
S or W-2908	3	3
S or W-2909	4	3
S or W-2910	4	4

Boiler Number	Left Front	Right Rear
S or W-3606	3	2
S or W-3607	3	3
S or W-3608	4	3
S or W-3609	4	4
S or W-3610	5	4
S or W-3611	5	5
S or W-3612	6	5
S or W-3613	6	6
S or W-3614	7	6
S or W-3615	7	7

Boiler Number	Left Front	Right Rear	Dead Plates	
			Front	Rear
S or W-4807	3	3	. . .	. . .
S or W-4808	4	3	. . .	. . .
S or W-4809	4	3	1	. . .
S or W-4810	4	4	1	. . .
S or W-4811	4	4	1	1
S or W-4812	4	4	1	2
S or W-4813	5	4	1	2
S or W-4814	5	4	1	3

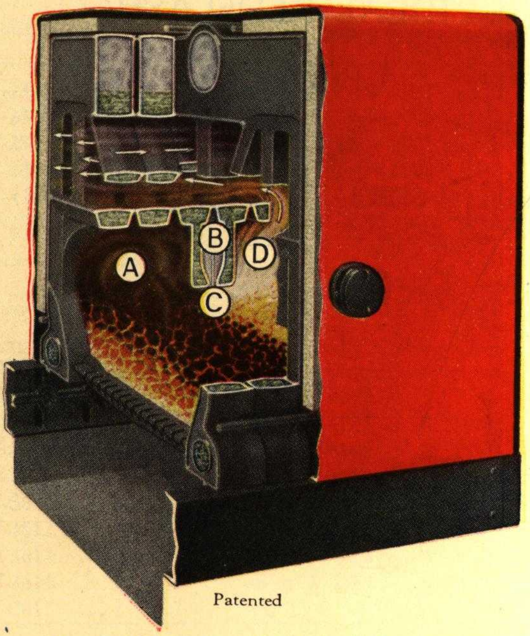
Boiler Number	Front Right	Front Left	Rear Right	Rear Left
S or W-7909	4	4	3	3
S or W-7910	4	4	4	4
S or W-7911	5	5	4	4
S or W-7912	5	5	5	5
S or W-7913	6	6	5	5
S or W-7914	6	6	6	6
S or W-7915	6	6	5	5
S or W-7916	6	6	5	5
S or W-7917	6	6	6	6

IDEAL REDFLASH
BOILERS

SPECIAL SMOKELESS
TYPE

IDEAL REDFLASH BOILER

SPECIAL SMOKELESS TYPE



Patented

Burns All Grades of Soft Coal Smokelessly

SERIES 2, 3, 4 and 5 of the Ideal Redflash Boiler are available with the famous Ideal Smoke Oxidizer for the complete and smokeless combustion of any grade of soft coal.

Air from the Oxidizer "B" supplies the required amount of oxygen for the complete combustion of the black, smoke laden volatile gases "A" distilled from the soft coal. As the mixture is drawn down to the glowing coal bed at "C," it is ignited and bursts with a hot flame into the secondary gas chamber "D" where the smoke laden combustible products are completely burned.

The Ideal Smoke Oxidizer is completely water-backed and cannot burn out.

NO. 1 IDEAL REDFLASH BOILER—Soft Coal—Performance Data—Steam and Water**

STEAM BOILERS					WATER BOILERS						CHIMNEY	
Boiler No.	Recommended Load (Radiation Plus Piping)		Total Boiler Output		Boiler No.	Recommended Load (Radiation Plus Piping)		Total Boiler Output		Grate Area Sq. Ft.	Height Ft.	Size In.
	E. D. R.* (240 B.t.u.)	B.t.u. Per Hour	E. D. R.* (240 B.t.u.)	B.t.u. Per Hour		E. D. R.* (150 B.t.u.)	B.t.u. Per Hour	E. D. R.* (150 B.t.u.)	B.t.u. Per Hour			
1-S-4	125	30000	350	84000	1-W-4-S	200	30000	560	84000	1.33	30	8 x 8
	200	48000				320	48000					
1-S-5	200	48000	500	120000	1-W-5-S	320	48000	800	120000	1.79	30	8 x 8
	275	66000				440	66000					
1-S-6	275	66000	650	156000	1-W-6-S	440	66000	1040	156000	2.25	30	8 x 8
	350	84000				560	84000					
1-S-7	350	84000	800	192000	1-W-7-S	560	84000	1280	192000	2.71	35	8 x 12
	425	102000				680	102000					
1-S-8	425	102000	950	228000	1-W-8-S	680	102000	1520	228000	3.17	35	8 x 12
	500	120000				800	120000					
1-S-9	500	120000	1100	264000	1-W-9-S	800	120000	1760	264000	3.63	35	8 x 12
	575	138000				920	138000					

*E. D. R. expresses Boiler Load in Equivalent Direct Radiation—Steam (240 B.t.u.)—Water (150 B.t.u.). Data based on fuel of 13,000 B.t.u./Lb.

**For dimensions, outlets, and inlets of No. 1 Ideal Redflash Boiler for All Fuels, see page A54. For guarantee see page A7.

NO. 2 IDEAL REDFLASH SMOKELESS BOILER—Performance Data—Steam and Water

STEAM BOILERS					WATER BOILERS						CHIMNEY	
Boiler No.	Recommended Load (Radiation Plus Piping)		Total Boiler Output		Boiler No.	Recommended Load (Radiation Plus Piping)		Total Boiler Output		Grate Area Sq. Ft	Height Ft.	Size In.
	E. D. R.* (240 B.t.u.)	B.t.u. Per Hour	E. D. R.* (240 B.t.u.)	B.t.u. Per Hour		E. D. R.* (150 B.t.u.)	B.t.u. Per Hour	E. D. R.* (150 B.t.u.)	B.t.u. Per Hour			
2-S- 8-S	800	192000	1800	432000	2-W- 8-S	1280	192000	2880	432000	6.17	40	12 x 12
	925	222000				1480	222000					
2-S- 9-S	925	222000	2050	492000	2-W- 9-S	1480	222000	3280	492000	7.06	40	12 x 16
	1050	252000				1680	252000					
2-S-10-S	1050	252000	2300	552000	2-W-10-S	1680	252000	3680	552000	7.95	45	12 x 16
	1175	282000				1880	282000					
2-S-11-S	1175	282000	2550	612000	2-W-11-S	1880	282000	4080	612000	8.84	45	12 x 16
	1300	312000				2080	312000					
2-S-12-S	1300	312000	2800	672000	2-W-12-S	2080	312000	4480	672000	9.73	50	12 x 16
	1425	342000				2280	342000					
2-S-13-S	1425	342000	3050	732000	2-W-13-S	2280	342000	4880	732000	10.62	50	12 x 16
	1550	372000				2480	372000					

*E. D. R. expresses Boiler Load in Equivalent Direct Radiation—Steam (240 B.t.u.)—Water (150 B.t.u.).
Data based on fuel of 13,000 B.t.u./Lb. For guarantee see page A7.

NO. 3 IDEAL REDFLASH SMOKELESS BOILER—Performance Data—Steam and Water

STEAM BOILERS					WATER BOILERS							CHIMNEY	
Boiler No.	Recommended Load (Radiation Plus Piping)		Total Boiler Output		Boiler No.	Recommended Load (Radiation Plus Piping)		Total Boiler Output		Grate Area Sq. Ft.			
	E. D. R.* (240 B.t.u.)	B.t.u. Per Hour	E. D. R.* (240 B.t.u.)	B.t.u. Per Hour		E. D. R.* (150 B.t.u.)	B.t.u. Per Hour	E. D. R.* (150 B.t.u.)	B.t.u. Per Hour		Height Ft.	Size In.	
3-S- 8-S	1500	360000	3500	840000	3-W- 8-S	2400	360000	5600	840000	9.35	50	16 x 16	
	2000	480000				3200	480000						
3-S- 9-S	1750	420000	4000	960000	3-W- 9-S	2800	420000	6400	960000	10.70	50	16 x 20	
	2250	540000				3600	540000						
3-S-10-S	2000	480000	4500	1080000	3-W-10-S	3200	480000	7200	1080000	12.05	55	16 x 20	
	2500	600000				4000	600000						
3-S-11-S	2250	540000	5000	1200000	3-W-11-S	3600	540000	8000	1200000	13.40	60	20 x 20	
	2750	660000				4400	660000						
3-S-12-S	2500	600000	5500	1320000	3-W-12-S	4000	600000	8800	1320000	14.75	65	20 x 20	
	3000	720000				4800	720000						
3-S-13-S	2750	660000	6000	1440000	3-W-13-S	4400	660000	9600	1440000	16.10	65	20 x 20	
	3250	780000				5200	780000						
3-S-14-S	3000	720000	6500	1560000	3-W-14-S	4800	720000	10400	1560000	17.45	70	20 x 20	
	3500	840000				5600	840000						

*E. D. R. expresses Boiler Load in Equivalent Direct Radiation—Steam (240 B.t.u.)—Water (150 B.t.u.).
Data based on fuel of 13,000 B.t.u. /Lb. For guarantee see page A7.

NO. 4 IDEAL REDFLASH SMOKELESS BOILER—Performance Data—Steam and Water

STEAM BOILERS					WATER BOILERS						CHIMNEY	
Boiler No.	Recommended Load (Radiation Plus Piping)		Total Boiler Output		Boiler No.	Recommended Load (Radiation Plus Piping)		Total Boiler Output		Grate Area Sq. Ft.	Height Ft.	Size In.
	E. D. R.* (240 B.t.u.)	B.t.u. Per Hour	E. D. R.* (240 B.t.u.)	B.t.u. Per Hour		E. D. R.* (150 B.t.u.)	B.t.u. Per Hour	E. D. R.* (150 B.t.u.)	B.t.u. Per Hour			
4-S- 9-S	2750	660000	6500	1560000	4-W- 9-S	4400	660000	10400	1560000	15.66	55	20 x 20
	3500	840000				5600	840000					
4-S-10-S	3125	750000	7250	1740000	4-W-10-S	5000	750000	11600	1740000	17.64	60	20 x 20
	3875	930000				6200	930000					
4-S-11-S	3500	840000	8000	1920000	4-W-11-S	5600	840000	12800	1920000	19.62	65	20 x 24
	4250	1020000				6800	1020000					
4-S-12-S	3875	930000	8750	2100000	4-W-12-S	6200	930000	14000	2100000	21.6	70	20 x 24
	4625	1110000				7400	1110000					
4-S-13-S	4250	1020000	9500	2280000	4-W-13-S	6800	1020000	15200	2280000	23.58	75	20 x 24
	5000	1200000				8000	1200000					
4-S-14-S	4625	1110000	10250	2460000	4-W-14-S	7400	1110000	16400	2460000	25.56	75	20 x 24
	5375	1290000				8600	1290000					

*E. D. R. expresses Boiler Load in Equivalent Direct Radiation—Steam (240 B.t.u.)—Water (150 B.t.u.).
Data based on fuel of 13,000 B.t.u./Lb. For guarantee see page A7.

NO. 5 IDEAL REDFLASH SMOKELESS BOILER—Performance Data—Steam and Water

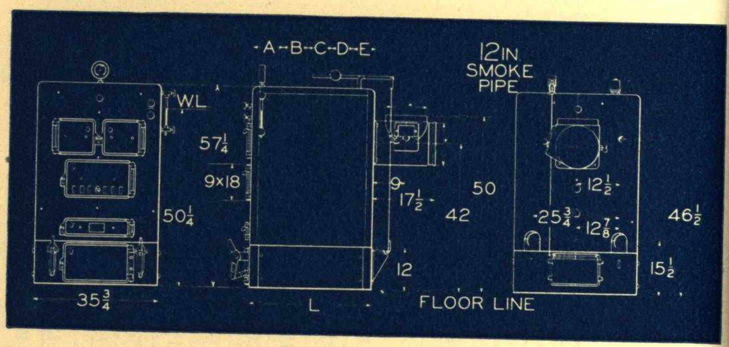
STEAM BOILERS					WATER BOILERS						CHIMNEY	
Boiler No.	Recommended Load (Radiation Plus Piping)		Total Boiler Output		Boiler No.	Recommended Load (Radiation Plus Piping)		Total Boiler Output		Grate Area Sq. Ft.	Height Ft.	Size In.
	E. D. R.* (240 B.t.u.)	B.t.u. Per Hour	E. D. R.* (240 B.t.u.)	B.t.u. Per Hour		E. D. R.* (150 B.t.u.)	B.t.u. Per Hour	E. D. R.* (150 B.t.u.)	B.t.u. Per Hour			
5-S- 9-S	4700	1128000	9100	2184000	5-W- 9-S	7520	1128000	14560	2184000	21.52	75	24 x 28
	5800	1392000				9280	1392000					
5-S-10-S	5250	1260000	10200	2448000	5-W-10-S	8400	1260000	16320	2448000	24.21	75	24 x 28
	6350	1524000				10160	1524000					
5-S-11-S	5800	1392000	11300	2712000	5-W-11-S	9280	1392000	18080	2712000	26.90	80	24 x 28
	6900	1656000				11040	1656000					
5-S-12-S	6350	1524000	12400	2976000	5-W-12-S	10160	1524000	19840	2976000	21.52	85	24 x 28
	7450	1788000				11920	1788000					
5-S-13-S	6900	1656000	13500	3240000	5-W-13-S	11040	1656000	21600	3240000	24.21	85	30 x 36
	8000	1920000				12800	1920000					
5-S-14-S	7450	1788000	14600	3504000	5-W-14-S	11920	1788000	23360	3504000	24.21	90	30 x 36
	8550	2052000				13680	2052000					
5-S-15-S	8000	1920000	15700	3768000	5-W-15-S	12800	1920000	25120	3768000	26.90	95	30 x 36
	9100	2184000				14560	2184000					

*E. D. R. expresses Boiler Load in Equivalent Direct Radiation—Steam (240 B.t.u.)—Water (150 B.t.u.).
Data based on fuel of 13,000 B.t.u. /Lb. **For guarantee see page A7.**

No. 2 Ideal Redflash Boiler—Steam and Water

SPECIAL SMOKELESS TYPE

Dimensions—Outlets—Inlets



Number of Boiler		Outlets Number and Size	Inlets Number and Size	Dimensions, Ins., for Locating Flow Tappings					
Steam	Water			A	B	C	D	E	L
2-S-8-S	2-W-8-S	2-4″	2-4″	15	20	. .	. .	5	40
2-S-9-S	2-W-9-S	2-4″	2-4″	10	30	. .	. .	5	45
2-S-10-S	2-W-10-S	2-4″	2-4″	15	30	. .	. .	5	50
2-S-11-S	2-W-11-S	3-4″	2-4″	10	20	20	. .	5	55
2-S-12-S	2-W-12-S	3-4″	2-4″	15	30	10	. .	5	60
2-S-13-S	2-W-13-S	4-4″	2-4″	10	20	20	10	5	65

ASSEMBLAGE OF SECTIONS

Number of Boiler		Assemblage
Steam	Water	
2-S-8-S	2-W-8-S	F-CX-AU-BX
2-S-9-S	2-W-9-S	A-FCX-C-AU-BX
2-S-10-S	2-W-10-S	F-CX-C-AU-BX
2-S-11-S	2-W-11-S	A-FCX-C-CX-AU-BX
2-S-12-S	2-W-12-S	F-CX-C-AC-RCX-BX
2-S-13-S	2-W-13-S	A-FCX-C-CX-AC-RCX-BX

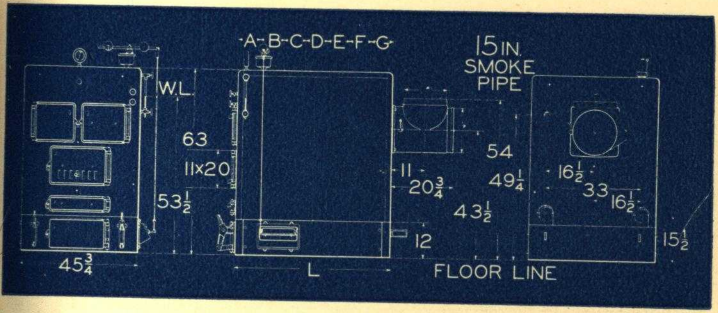
A = 5″ Front Section.
F = 10″ Front Section.
FCX = Front Center Connecting Section.
C = Center Section.
CX = Center Connecting Section.

AU = Auxiliary Air Section (with uptake).
AC = Auxiliary Air Section (no uptake).
RCX = Rear Center Uptake Connecting Section.
BX = Back Connecting Section.

No. 3 Ideal Redflash Boiler—Steam and Water

SPECIAL SMOKELESS TYPE

Dimensions—Outlets—Inlets



Number of Boiler		Outlets Number and Size	Inlets Number and Size	Dimensions, Inches, for Locating Flow Tappings							
Steam	Water			A	B	C	D	E	F	G	L
3-S-8-S	3-W-8-S	3-4″	2-5″	9	18	12	..	..	..	9	48
3-S-9-S	3-W-9-S	4-4″	2-5″	9	12	12	12	..	..	9	54
3-S-10-S	3-W-10-S	4-4″	2-5″	9	12	12	12	..	..	15	60
3-S-11-S	3-W-11-S	4-4″	2-5″	9	12	18	18	..	..	9	66
3-S-12-S	3-W-12-S	5-4″	2-5″	9	18	12	12	12	..	9	72
3-S-13-S	3-W-13-S	5-4″	2-5″	9	18	18	12	12	..	9	78
3-S-14-S	3-W-14-S	6-4″	2-5″	9	12	12	18	12	12	9	84

ASSEMBLAGE OF SECTIONS

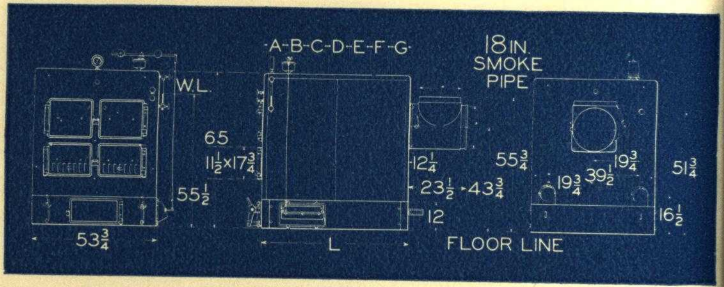
Number of Boiler		Assemblage
Steam	Water	
3-S-8-S	3-W-8-S	F-FCX-C-C-FAX-RA-RCX-B
3-S-9-S	3-W-9-S	F-FCX-C-CX-C-FAX-RA-RCX-B
3-S-10-S	3-W-10-S	F-FCX-C-CX-C-FAX-RA-RCX-RC-B
3-S-11-S	3-W-11-S	F-FCX-C-CX-C-C-FAX-RA-RC-RCX-B
3-S-12-S	3-W-12-S	F-FCX-C-C-CX-C-FAX-RA-RCX-RC-RCX-B
2-S-13-S	3-W-13-S	F-FCX-C-C-CX-C-C-FAX-RA-RCX-RC-RCX-B
3-S-14-S	3-W-14-S	F-FCX-C-CX-C-CX-C-C-FAX-RA-RCX-RC-RCX-B

F = Front Section.
FCX = Front Center Connecting Section.
C = Center Section.
CX = Center Connecting Section.
FAX = Front Auxiliary Air Connecting Section.
RA = Rear Auxiliary Air Section.
RC = Rear Center Uptake Section.
RCX = Rear Center Uptake Connecting Section.
B = Back Section.

No. 4 Ideal Redflash Boiler—Steam and Water

SPECIAL SMOKELESS TYPE

Dimensions—Outlets—Inlets



Number of Boiler		Outlets Number and Size	Inlets Number and Size	Dimensions, Inches, for Locating Flow Tappings							
Steam	Water			A	B	C	D	E	F	G	L
4-S-9-S	4-W-9-S	4-4″	2-6″	10½	14	14	14	..	..	10½	63
4-S-10-S	4-W-10-S	4-4″	2-6″	10½	14	14	14	..	..	17½	70
4-S-11-S	4-W-11-S	5-4″	2-6″	10½	14	14	14	14	..	10½	77
4-S-12-S	4-W-12-S	5-4″	2-6″	10½	14	14	14	14	..	17½	84
4-S-13-S	4-W-13-S	6-4″	2-6″	10½	14	14	14	14	14	10½	91
4-S-14-S	4-W-14-S	6-4″	2-6″	10½	14	14	14	14	14	17½	98

ASSEMBLAGE OF SECTIONS

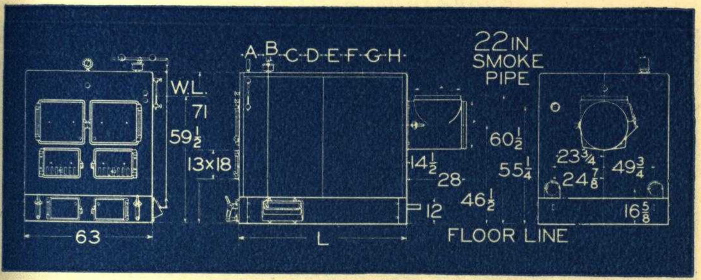
Number of Boiler		Assemblage
Steam	Water	
4-S-9-S	4-W-9-S	F-FCX-C-CX-C-FAX-RA-RCX-B
4-S-10-S	4-W-10-S	F-FCX-C-CX-C-FAX-RA-RCX-RC-B
4-S-11-S	4-W-11-S	F-FCX-C-CX-C-CX-FA-RAX-RC-RCX-B
4-S-12-S	4-W-12-S	F-FCX-C-CX-C-CX-FA-RAX-RC-RCX-RC-B
4-S-13-S	4-W-13-S	F-FCX-C-CX-C-CX-C-FAX-RA-RCX-RC-RCX-B
4-S-14-S	4-W-14-S	F-FCX-C-CX-C-CX-C-CX-FA-RAX-RC-RCX-RC-B

F = Front Section.
FCX = Front Center Connecting Section.
C = Center Section.
CX = Center Connecting Section.
FA = Front Auxiliary Air Section.
FAX = Front Auxiliary Air Connecting Section.
RA = Rear Auxiliary Air Section.
RAX = Rear Auxiliary Air Connecting Section.
RC = Rear Center Section.
RCX = Rear Center Connecting Section.
B = Back Section.

No. 5 Ideal Redflash Boiler—Steam and Water

SPECIAL SMOKELESS TYPE

Dimensions—Outlets—Inlets



Number of Boiler		Outlets Number and Size	Inlets Number and Size	Dimensions, Ins., for Locating Flow Tappings								
Steam	Water			A	B	C	D	E	F	G	H	L
5-S-9-S	5-W-9-S	4-5″	2-6″	12	16	16	16	...	...	...	12	72
5-S-10-S	5-W-10-S	4-5″	2-6″	12	16	24	16	...	...	...	12	80
5-S-11-S	5-W-11-S	5-5″	2-6″	12	16	16	16	16	...	...	12	88
5-S-12-S	5-W-12-S	5-5″	2-6″	12	16	16	16	16	...	...	20	96
5-S-13-S	5-W-13-S	5-5″	2-6″	12	16	24	16	24	...	...	12	104
5-S-14-S	5-W-14-S	6-5″	2-6″	12	16	16	24	16	16	...	12	112
5-S-15-S	5-W-15-S	6-5″	2-6″	12	16	24	16	24	16	...	12	120

ASSEMBLAGE OF SECTIONS

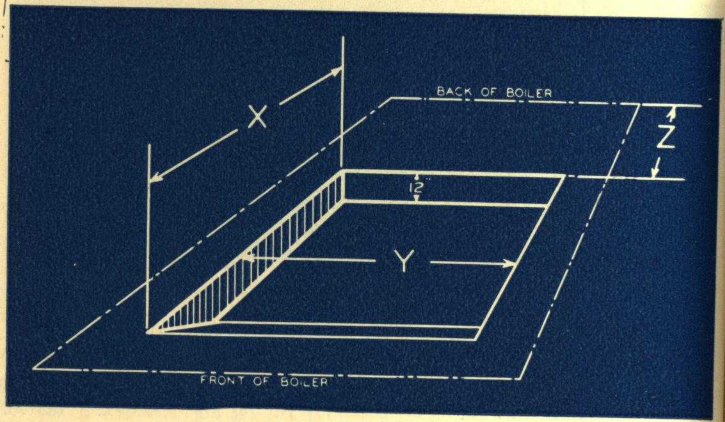
Number of Boiler		Assemblage
Steam	Water	
5-S-9-S	5-W-9-S	F-FCX-C-CX-C-FAX-RU-RCX-B
5-S-10-S	5-W-10-S	F-FCX-C-CX-C-FA-RUX-RC-RCX-B
5-S-11-S	5-W-11-S	F-FCX-C-CX-C-CX-FA-RUX-RC-RCX-B
5-S-12-S	5-W-12-S	F-FCX-C-CX-C-FAX-RA-CX-BW-RCX-RC-BD
5-S-13-S	5-W-13-S	F-FCX-C-CX-C-FA-RAX-C-CX-BW-RC-RCX-BD
5-S-14-S	5-W-14-S	F-FCX-C-CX-C-CX-FA-RA-CX-BW-RCX-RC-RCX-BD
5-S-15-S	5-W-15-S	F-FCX-C-CX-C-C-FAX-RA-CX-C-BW-RCX-RC-RCX-BD

F = Front Section.
FCX = Front Center Connecting Section.
C = Center Section.
CX = Center Connecting Section.
FA = Front Auxiliary Section.
FAX = Front Auxiliary Air Connecting Section.
RA = Rear Auxiliary Air Section.
RAX = Rear Auxiliary Air Connecting Section.
RU = Rear Auxiliary Air Uptake Section.
RUX = Rear Auxiliary Air Uptake Connecting Section.
BW = Bridgewall Section.
RC = Rear Center Section.
RCX = Rear Center Connecting Section.
B = Back Section.
BD = Back with Cleanout Door.

IDEAL REDFLASH BOILERS

SPECIAL SMOKELESS TYPE

ASHPIT DIMENSIONS



No. 2 Boiler

Number of Sections	Dimensions in Inches			
	Depth	"X"	"Y"	"Z"
8	12	32	29	4
9	12	37	29	4
10	12	42	29	4
11	12	47	29	4
12	12	52	29	4
13	12	57	29	4

No. 4 Boiler

Number of Sections	Dimensions in Inches			
	Depth	"X"	"Y"	"Z"
9	12	53	47	5
10	12	60	47	5
11	12	67	47	5
12	12	74	47	5
13	12	81	47	5
14	12	88	47	5

No. 3 Boiler

Number of Sections	Dimensions in Inches			
	Depth	"X"	"Y"	"Z"
8	12	40	39	4
9	12	46	39	4
10	12	52	29	4
11	12	58	39	4
12	12	64	39	4
13	12	70	39	4
14	12	76	39	4

No. 5 Boiler

Number of Sections	Dimensions in Inches			
	Depth	"XX"	"Y"	"Z"
9	12	62	57	5
10	12	70	57	5
11	12	78	57	5
12	12	61	57	30
13	12	61	57	38
14	12	69	57	38
15	12	69	57	46

Arrangement of Grate Bars*

Ideal Redflash Boilers

Special Smokeless Type

Boiler Number	Left Front	Right Rear
2-S or W- 8-S	6	. . .
2-S or W- 9-S	7	. . .
2-S or W-10-S	4	4
2-S or W-11-S	5	4
2-S or W-12-S	5	5
2-S or W-13-S	6	5

Boiler Number	Left Front	Right Rear
3-S or W- 8-S	3	3
3-S or W- 9-S	4	3
3-S or W-10-S	4	4
3-S or W-11-S	5	4
3-S or W-12-S	5	5
3-S or W-13-S	6	5
3-S or W-14-S	6	6

Boiler Number	Left Front	Right Rear
4-S or W- 9-S	4	3
4-S or W-10-S	4	4
4-S or W-11-S	5	4
4-S or W-12-S	5	5
4-S or W-13-S	6	5
4-S or W-14-S	6	6

Boiler Number	Left Front	Right Front	Dead Plates		
			Single	Double	Rear
5-S or W- 9-S	4	3	. . .	. . .	. . .
5-S or W-10-S	4	4	. . .	. . .	. . .
5-S or W-11-S	5	4	. . .	. . .	. . .
5-S or W-12-S	4	3	1	. . .	1
5-S or W-13-S	4	4	1	. . .	1
5-S or W-14-S	4	4	. . .	1	1
5-S or W-15-S	5	4	. . .	1	1

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*For arrangement of grate bars of No. 1 Ideal Redflash Boiler for All Fuels, see page A60.

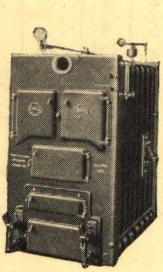
IDEAL SMOKELESS BOILERS

SIMPLE in its operation, requiring no special degree of skilled attendance, the Ideal Smokeless Boiler burns all grades of soft coal smokelessly and economically. It complies with the most rigid city smoke ordinances.

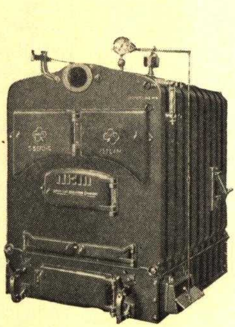
This boiler accomplishes its high record of smokeless performance thru its special, patented device, the Ideal Smoke Oxidizer. It inducts and distributes fresh air in fine uniform streams over a bed of glowing coal where it mixes with the black volatile matter. A perfect mixture is effected which ignites and burns at an exceedingly high temperature, consuming, within the boiler, the smoke-producing particles of carbon. In this way the smoke nuisance is eliminated and the heat value of the smoke is converted into practical service.

The Ideal Smoke Oxidizer is an integral part of the boiler. It eliminates the need of brick linings and other accessories. Being water-backed throughout, it cannot burn out.

Tapped for Excelso Heater on Order.

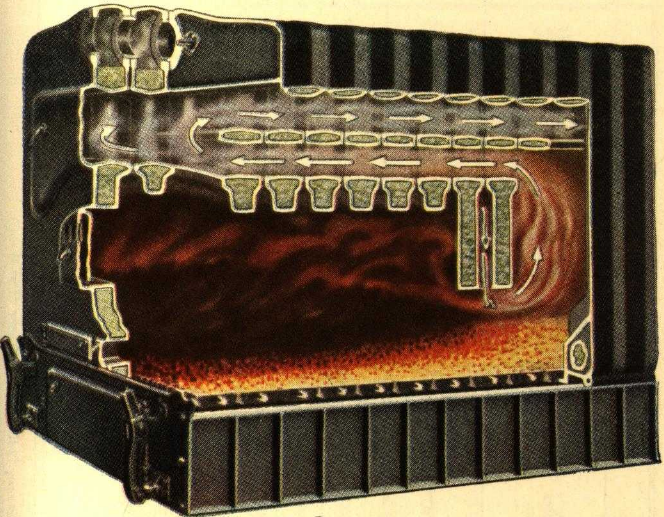


29-inch Boiler



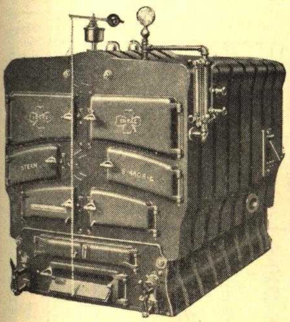
36-inch Boiler

IDEAL SMOKELESS BOILERS

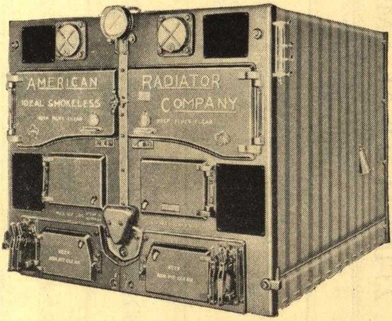


Patented

The Ideal Smoke Oxidizer is feeding a supply of fresh air in fine, uniform streams to the smoke-laden volatile matter distilled from the bed of soft coal. A thorough, compressed mixture of air and volatile matter is effected, which is ignited by the glowing coals at the base of the Mixing Channel. This mixture bursts into flame in the rear gas chamber at a high temperature, completely burning the smoke-making particles.



48-inch Boiler



79-inch Boiler

23-INCH IDEAL SMOKELESS BOILER—Performance Data—Steam and Water

STEAM BOILERS					WATER BOILERS						CHIMNEY	
Boiler No.	Recommended Load (Radiation Plus Piping)		Total Boiler Output		Boiler No.	Recommended Load (Radiation Plus Piping)		Total Boiler Output		Grate Area Sq. Ft.	Height Ft.	Size In.
	E. D. R.* (240 B.t.u.)	B.t.u. Per Hour	E. D. R.* (240 B.t.u.)	B.t.u. Per Hour		E. D. R.* (150 B.t.u.)	B.t.u. Per Hour	E. D. R.* (150 B.t.u.)	B.t.u. Per Hour			
S-2308-S	675	162000	1050	252000	W-2308-S	1080	162000	1680	252000	4.64	35	12 x 12
	750	180000				1200	180000					
S-2309-S	750	180000	1200	288000	W-2309-S	1200	180000	1920	288000	5.28	35	12 x 12
	825	198000				1320	198000					
S-2310-S	825	198000	1350	324000	W-2310-S	1320	198000	2160	324000	5.92	40	12 x 12
	900	216000				1440	216000					
S-2311-S	900	216000	1500	360000	W-2311-S	1440	216000	2400	360000	6.56	40	12 x 12
	975	234000				1560	234000					
S-2312-S	975	234000	1650	396000	W-2312-S	1560	234000	2640	396000	7.20	40	12 x 16
	1050	252000				1680	252000					

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*E. D. R. expresses Boiler Load in Equivalent Direct Radiation—Steam (240 B.t.u.)—Water (150 B.t.u.).
Data based on fuel of 13,000 B.t.u./Lb. For guarantee see page A7.

29-INCH IDEAL SMOKELESS BOILER—Performance Data—Steam and Water

STEAM BOILERS					WATER BOILERS						CHIMNEY	
Boiler No.	Recommended Load (Radiation Plus Piping)		Total Boiler Output		Boiler No.	Recommended Load (Radiation Plus Piping)		Total Boiler Output		Grate Area Sq. Ft.	Height Ft.	Size In.
	E. D. R.* (240 B.t.u.)	B.t.u. Per Hour	E. D. R.* (240 B.t.u.)	B.t.u. Per Hour		E. D. R.* (150 B.t.u.)	B.t.u. Per Hour	E. D. R.* (150 B.t.u.)	B.t.u. Per Hour			
S-2907-S	1000	240000	2400	576000	W-2907-S	1600	240000	3840	576000	7.26	40	16 x 16
	1200	288000				1920	288000					
S-2908-S	1200	288000	2800	672000	W-2908-S	1920	288000	4480	672000	8.47	45	16 x 16
	1400	336000				2240	336000					
S-2909-S	1400	336000	3200	768000	W-2909-S	2240	336000	5120	768000	9.68	50	16 x 20
	1600	384000				2560	384000					
S-2910-S	1600	384000	3600	864000	W-2910-S	2560	384000	5760	864000	10.89	55	16 x 20
	1800	432000				2880	432000					
S-2911-S	1800	432000	4000	960000	W-2911-S	2880	432000	6400	960000	12.10	60	20 x 20
	2000	480000				3200	480000					

*E. D. R. expresses Boiler Load in Equivalent Direct Radiation—Steam (240 B.t.u.)—Water (150 B.t.u.).
Data based on fuel of 13,000 B.t.u./Lb. For guarantee see page A7.

36-INCH IDEAL SMOKELESS BOILER—Performance Data—Steam and Water

STEAM BOILERS					WATER BOILERS						CHIMNEY	
Boiler No.	Recommended Load (Radiation Plus Piping)		Total Boiler Output		Boiler No.	Recommended Load (Radiation Plus Piping)		Total Boiler Output		Grate Area Sq. Ft.	Height Ft.	Size In.
	E. D. R.* (240 B.t.u.)	B.t.u. Per Hour	E. D. R.* (240 B.t.u.)	B.t.u. Per Hour		E. D. R.* (150 B.t.u.)	B.t.u. Per Hour	E. D. R.* (150 B.t.u.)	B.t.u. Per Hour			
S-3608-S	1850	444000	4450	1068000	W-3608-S	2960	444000	7120	1068000	10.50	50	20 x 20
	2500	600000				4000	600000					
S-3609-S	2175	522000	5100	1224000	W-3609-S	3480	522000	8160	1224000	12.00	55	20 x 20
	2825	678000				4520	678000					
S-3610-S	2500	600000	5750	1380000	W-3610-S	4000	600000	9200	1380000	13.50	55	20 x 20
	3150	756000				5040	756000					
S-3611-S	2825	678000	6400	1536000	W-3611-S	4520	678000	10240	1536000	15.00	60	20 x 20
	3475	834000				5560	834000					
S-3612-S	3150	756000	7050	1692000	W-3612-S	5040	756000	11280	1692000	16.50	60	20 x 24
	3800	912000				6080	912000					
S-3613-S	3475	834000	7700	1848000	W-3613-S	5560	834000	12320	1848000	18.00	65	20 x 24
	4125	990000				6600	990000					
S-3614-S	3800	912000	8350	2004000	W-3614-S	6080	912000	13360	2004000	19.50	70	20 x 24
	4450	1068000				7120	1068000					
S-3615-S	4125	990000	9000	2160000	W-3615-S	6600	990000	14400	2160000	21.00	75	24 x 24
	4775	1146000				7640	1146000					

*E. D. R. expresses Boiler Load in Equivalent Direct Radiation—Steam (240 B.t.u.)—Water (150 B.t.u.).
Data based on fuel of 13,000 B.t.u./Lb. For guarantee see page A7.

Data based on fuel of 13,000 B.t.u. /Lb. For guarantee see page A7.

48-INCH IDEAL SMOKELESS BOILER—Performance Data—Steam and Water

STEAM BOILERS					WATER BOILERS						CHIMNEY	
Boiler No.	Recommended Load (Radiation Plus Piping)		Total Boiler Output		Boiler No.	Recommended Load (Radiation Plus Piping)		Total Boiler Output		Grate Area Sq. Ft.	Height Ft.	Size In.
	E. D. R.* (240 B.t.u.)	B.t.u. Per Hour	E. D. R.* (240 B.t.u.)	B.t.u. Per Hour		E. D. R.* (150 B.t.u.)	B.t.u. Per Hour	E. D. R.* (150 B.t.u.)	B.t.u. Per Hour			
S-4807-S	4625	1110000	9000	2160000	W-4807-S	7400	1110000	14400	2160000	21.60	70	24 x 24
	5875	1410000				9400	1410000					
S-4808-S	5875	1410000	10250	2460000	W-4808-S	9400	1410000	16400	2460000	25.20	75	24 x 24
	7125	1710000				11400	1710000					
S-4809-S	6500	1560000	11500	2760000	W-4809-S	10400	1560000	18400	2760000	25.20	80	24 x 28
	7750	1860000				12400	1860000					
S-4810-S	7125	1710000	12750	3060000	W-4810-S	11400	1710000	20400	3060000	28.80	85	24 x 28
	8375	2010000				13400	2010000					
S-4811-S	7750	1860000	14000	3360000	W-4811-S	12400	1860000	22400	3360000	28.80	95	28 x 28
	9000	2160000				14400	2160000					
S-4812-S	8375	2010000	15250	3660000	W-4812-S	13400	2010000	24400	3660000	28.80	100	28 x 28
	9625	2310000				15400	2310000					
S-4813-S	9000	2160000	16500	3960000	W-4813-S	14400	2160000	26400	3960000	32.40	105	28 x 32
	10250	2460000				16400	2460000					
S-4814-S	9625	2310000	17750	4260000	W-4814-S	15400	2310000	28400	4260000	32.40	110	28 x 32
	10875	2610000				17400	2610000					

*E. D. R. expresses Boiler Load in Equivalent Direct Radiation—Steam (240 B.t.u.)—Water (150 B.t.u.).
Data based on fuel of 13,000 B.t.u. /Lb. For guarantee see page A7.

79-INCH IDEAL SMOKELESS BOILER—Performance Data—Steam and Water

STEAM BOILERS					WATER BOILERS						CHIMNEY	
Boiler No.	Recommended Load (Radiation Plus Piping)		Total Boiler Output		Boiler No.	Recommended Load (Radiation Plus Piping)		Total Boiler Output		Grate Area Sq. Ft.	Height Ft.	Size In.
	E. D. R.* (240 B.t.u.)	B.t.u. Per Hour	E. D. R.* (240 B.t.u.)	B.t.u. Per Hour		E. D. R.* (150 B.t.u.)	B.t.u. Per Hour	E. D. R.* (150 B.t.u.)	B.t.u. Per Hour			
S-7909-S	6000	1440000	14000	3360000	W-7909-S	9600	1440000	22400	3360000	21.9	85	24 x 28
	8000	1920000				12800	1920000					
S-7910-S	7000	1680000	15500	3720000	W-7910-S	11200	1680000	24800	3720000	24.9	90	24 x 28
	9000	2160000				14400	2160000					
S-7911-S	8000	1920000	17000	4080000	W-7911-S	12800	1920000	27200	4080000	28.0	95	24 x 28
	10000	2400000				16000	2400000					
S-7912-S	9000	2160000	18500	4440000	W-7912-S	14400	2160000	29600	4440000	31.1	100	28 x 28
	11000	2640000				17600	2640000					
S-7913-S	10000	2400000	20000	4800000	W-7913-S	16000	2400000	32000	4800000	34.2	105	30 x 30
	12000	2880000				19200	2880000					

*E. D. R. expresses Boiler Load in Equivalent Direct Radiation—Steam (240 B.t.u.)—Water (150 B.t.u.).
Data based on fuel of 13,000 B.t.u./Lb. For guarantee see page A7.

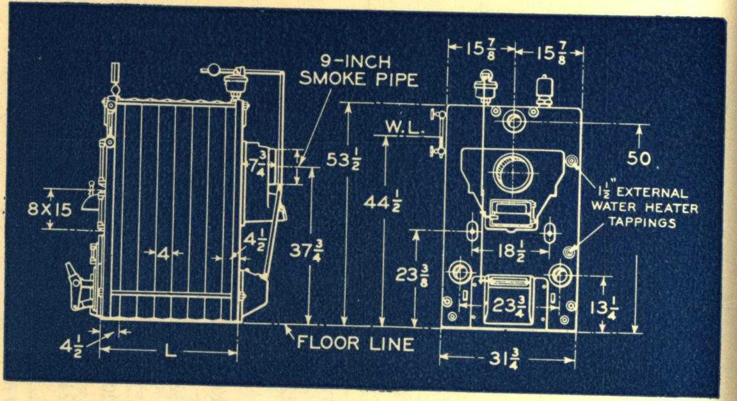
79-INCH IDEAL SMOKELESS BOILER—Performance Data—Steam and Water

STEAM BOILERS					WATER BOILERS						CHIMNEY	
	Recommended Load (Radiation Plus Piping)		Total Boiler Output			Recommended Load (Radiation Plus Piping)		Total Boiler Output				
Boiler No.	E. D. R.* (240 B.t.u.)	B.t.u. Per Hour	E. D. R.* (240 B.t.u.)	B.t.u. Per Hour	Boiler No.	E. D. R.* (150 B.t.u.)	B.t.u. Per Hour	E. D. R.* (150 B.t.u.)	B.t.u. Per Hour	Grate Area Sq. Ft.	Height Ft.	Size In.
S-7914-S	11000	2640000	21500	5160000	W-7914-S	17600	2640000	34400	5160000	37.3	110	30 x 36
	13000	3120000				20800	3120000					
S-7915-S	12000	2880000	23000	5520000	W-7915-S	19200	2880000	36800	5520000	34.2	115	30 x 36
	14000	3360000				22400	3360000					
S-7916-S	12000	2880000	24500	5880000	W-7916-S	19200	2880000	39200	5880000	37.3	120	36 x 36
	14000	3360000				22400	3360000					
S-7917-S	13000	3120000	26000	6240000	W-7917-S	20800	3120000	41600	6240000	37.3	125	36 x 36
	15000	3600000				24000	3600000					

*E. D. R. expresses Boiler Load in Equivalent Direct Radiation—Steam (240 B.t.u.)—Water (150 B.t.u.).
Data based on fuel of 13,000 B.t.u./Lb. For guarantee see page A7.

23-Inch Ideal Smokeless Boiler

Dimensions—Outlets—Inlets



Number of Boiler		Total Length	Outlets Number and Size	Inlets Number and Size
Steam	Water			
S-2308-S	W-2308-S	33″	1-4″	2-3″
S-2309-S	W-2309-S	37″	1-4″	2-3″
S-2310-S	W-2310-S	41″	1-4″	2-3″
S-2311-S	W-2311-S	45″	2-4″	2-3″
S-2312-S	W-2312-S	49″	2-4″	2-3″

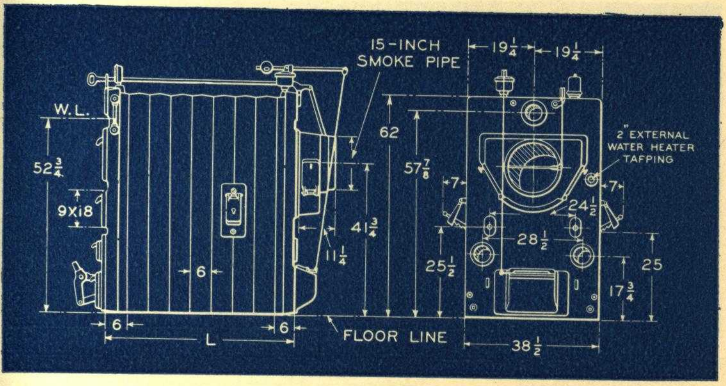
ASSEMBLAGE OF SECTIONS

Number of Boiler		Assemblage
Steam	Water	
S-2308-S	W-2308-S	A-4C-DF-G-H
S-2309-S	W-2309-S	A-4C-DF-C-G-H
S-2310-S	W-2310-S	A-4C-DF-2C-G-H
S-2311-S	W-2311-S	A-5C-DF-C-2G-H
S-2312-S	W-2312-S	A-B-4C-2C-2G-H

A=Front Section.
B=Front Center Section.
C=Center Section.
H=Back Section.
G=Rear Center (Uptake).

29-Inch Ideal Smokeless Boiler

Dimensions—Outlets—Inlets



Number of Boiler		Total Length	Steam		Water	
Steam	Water		Outlets Number and Size	Inlets Number and Size	Outlets Number and Size	Inlets Number and Size
S-2907-S	W-2907-S	42″	1-5″	2-4″	2-5″	2-5″
S-2908-S	W-2908-S	48″	1-5″	2-4″	2-5″	2-5″
S-2909-S	W-2909-S	54″	2-5″	2-4″	2-5″	2-5″
S-2910-S	W-2910-S	60″	2-5″	2-4″	2-5″	2-5″
S-2911-S	W-2911-S	66″	2-5″	2-4″	2-5″	2-5″

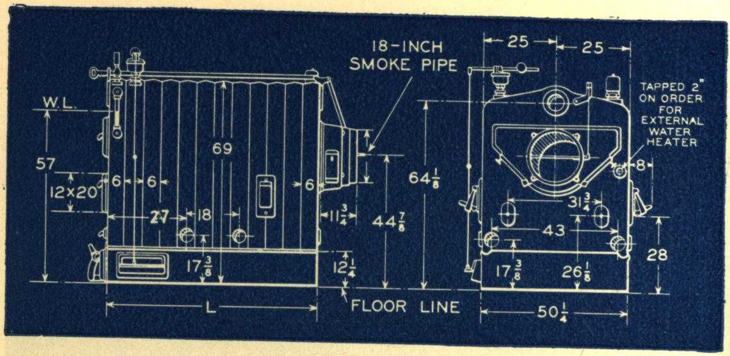
ASSEMBLAGE OF SECTIONS

Number of Boiler		Assemblage
Steam	Water	
S-2907-S	W-2907-S	A-3C-FA-OA-H
S-2908-S	W-2908-S	A-3C-FA-RA-U-H
S-2909-S	W-2909-S	A-4C-FA-RA-U-H
S-2910-S	W-2910-S	A-5C-FA-RA-U-H
S-2911-S	W-2911-S	A-6C-FA-RA-U-H

A = Front Section.
C = Center Section.
FA = Front Auxiliary Air Section.
U = Rear Center Uptake.
OA = Rear Auxiliary Air Section (Open Uptake).
RA = Rear Auxiliary Air Section (Closed Uptake).
H = Back.

36-Inch Ideal Smokeless Boiler

Dimensions—Outlets—Inlets



Number of Boiler		Total Length	Steam		Water	
Steam	Water		Outlets Number and Size	Inlets Number and Size	Outlets Number and Size	Inlets Number and Size
S-3608-S	W-3608-S	48″	2-6″	2-4″	2-6″	2-3½″ & 2-4″
S-3609-S	W-3609-S	54″	2-6″	2-4″	2-6″	2-3½″ & 2-4″
S-3610-S	W-3610-S	60″	2-6″	2-4″	2-6″	2-3½″ & 2-4″
S-3611-S	W-3611-S	66″	2-6″	2-4″	2-6″	2-3½″ & 2-4″
S-3612-S	W-3612-S	72″	2-6″	2-4″	2-6″	2-3½″ & 2-4″
S-3613-S	W-3613-S	78″	2-6″	2-4″	2-6″	4-3½″ & 2-4″
S-3614-S	W-3614-S	84″	2-6″	2-4″	2-6″	4-3½″ & 2-4″
S-3615-S	W-3615-S	90″	2-6″	2-4″	2-6″	4-3½″ & 2-4″

ASSEMBLAGE OF SECTIONS

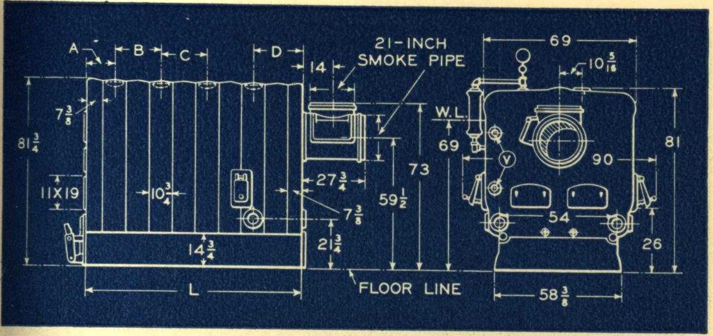
Steam Boilers		Water Boilers	
Number of Boiler	Assemblage	Number of Boiler	Assemblage
S-3608-S	A-4C-FA-OA-H	W-3608-S	A-3C-D-FA-OA-H
S-3609-S	A-4C-FA-RA-U-H	W-3609-S	A-3C-D-FA-RA-U-H
S-3610-S	A-5C-FA-RA-U-H	W-3610-S	A-3C-D-C-FA-RA-U-H
S-3611-S	A-6C-FA-RA-U-H	W-3611-S	A-3C-D-2C-FA-RA-U-H
S-3612-S	A-B-6C-FA-RA-U-H	W-3612-S	A-B-2C-D-2C-D-FA-RA-U-H
S-3613-S	A-B-6C-FA-RA-2U-H	W-3613-S	A-B-2C-D-2C-D-FA-RA-2U-H
S-3614-S	A-B-7C-FA-RA-2U-H	W-3614-S	A-B-2C-D-2C-D-C-FA-RA-2U-H
S-3615-S	A-B-8C-FA-RA-2U-H	W-3615-S	A-B-2C-D-2C-D-2C-FA-RA-2U-H

A = Front Section.
B = Front Center Section.
C = Center Section.
D = Center Connecting Section. (Return Only).
H = Back Section.

FA = Front Auxiliary Air Section.
RA = Rear Auxiliary Air Section (Closed Uptake).
OA = Rear Auxiliary Air Section (Open Uptake).
U = Rear Center Uptake.

48-Inch Ideal Smokeless Boiler

Dimensions—Outlets—Inlets



TAPPED 3″ ON ORDER FOR EXTERNAL WATER HEATER AT POINTS V

Number of Boiler		Total Length	Steam		Water		Boiler Outlets			
Steam	Water		Outlets Number and Size	Inlets Number and Size	Outlets Number and Size	Inlets Number and Size	A	B	C	D
S-4807-S	W-4807-S	68½″	3-6″	4-4″	3-6″	4-6″	12¾″	21½″	......	12¾″
S-4808-S	W-4808-S	79¼″	3-6″	4-4″	3-6″	4-6″	12¾″	21½″	......	12¾″
S-4809-S	W-4809-S	90″	3-6″	4-4″	3-6″	4-6″	12¾″	32¼″	......	23½″
S-4810-S	W-4810-S	100¾″	3-6″	4-4″	3-6″	4-6″	12¾″	32¼″	......	23½″
S-4811-S	W-4811-S	111½″	4-6″	4-4″	4-6″	4-6″	12¾″	21½″	21½″	23½″
S-4812-S	W-4812-S	122¼″	4-6″	4-4″	4-6″	4-6″	12¾″	21½″	21½″	23½″
S-4813-S	W-4813-S	133″	4-6″	4-4″	4-6″	4-6″	12¾″	21½″	32¼″	23½″
S-4814-S	W-4814-S	143¾″	4-6″	4-4″	4-6″	4-6″	12¾″	21½″	32¼″	23½″

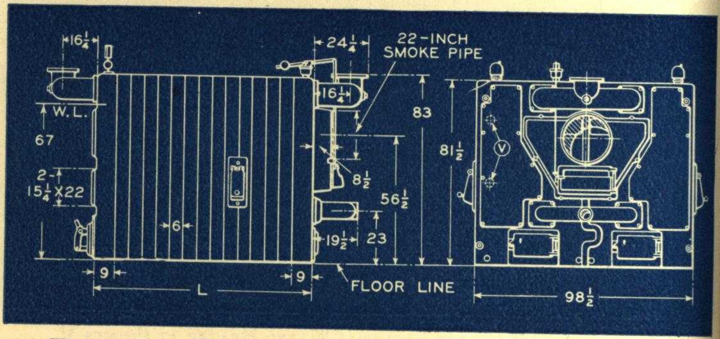
ASSEMBLAGE OF SECTIONS

Number of Boiler		Assemblage	
Steam	Water	Left Half	Right Half
S-4807-S	W-4807-S	A-CX-F-NX-SA-RX-I	A-K-F-F-SA-OX-I
S-4808-S	W-4808-S	A-CX-F-NX-F-SA-RX-I	A-K-F-F-F-SA-OX-I
S-4809-S	W-4809-S	A-CX-F-F-NX-SA-RX-U-I	A-K-F-F-F-SA-OX-U-I
S-4810-S	W-4810-S	A-CX-F-F-NX-F-SA-RX-U-I	A-K-F-F-F-F-SA-OX-U-I
S-4811-S	W-4811-S	A-CX-F-NX-F-NX-SA-RA-GX-U-I	A-K-F-F-F-F-SA-RA-MX-U-I
S-4812-S	W-4812-S	A-CX-F-NX-F-NX-SA-RA-U-GX-U-I	A-K-F-F-F-F-SA-RA-U-MX-U-I
S-4813-S	W-4813-S	A-CX-F-NX-F-F-NX-SA-RA-U-GX-U-I	A-K-F-F-F-F-F-SA-RA-U-MX-U-I
S-4814-S	W-4814-S	A-CX-F-NX-F-F-NX-SA-RA-F-U-GX-U-I	A-K-F-F-F-F-F-SA-RA-F-U-MX-U-I

A = Front Section.
K = Closed Front Flue.
CX = Closed Front Flue Connecting (Supply Only).
F = Closed Center Section.
NX = Closed Center Connecting (Supply Only).
SA = Front Auxiliary Air Section.
RA = Rear Auxiliary Air Section.
RX = Rear Auxiliary Air Open Uptake Section (Supply and Return).
OX = Rear Auxiliary Air Open Uptake Section (Return Only).
U = Open Rear Center.
MX = Open Rear Center Connecting (Return Only).
GX = Open Rear Center Connecting (Supply and Return).
I = Open Back.

79-Inch Ideal Smokeless Boiler

Dimensions—Outlets—Inlets



Tapped 3″ on Order for External Water Heater at Points V

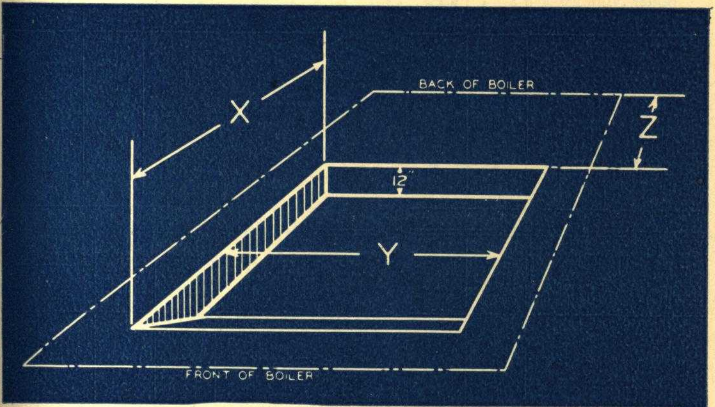
Number of Boiler		Total Length	Steam Boiler		Water Boiler	
Steam	Water		Outlets Number and Size	Inlets Number and Size	Outlets Number and Size	Inlets Number and Size
S-7909-S	W-7909-S	60″	1-10″	1-4″	1-10″	2-10″
S-7910-S	W-7910-S	66″	1-10″	1-4″	1-10″	2-10″
S-7911-S	W-7911-S	72″	2-10″	2-4″	1-10″	2-10″
S-7912-S	W-7912-S	78″	2-10″	2-4″	1-10″	2-10″
S-7913-S	W-7913-S	84″	2-10″	7-4″	1-10″	2-10″
S-7914-S	W-7914-S	90″	2-10″	2-4″	1-10″	2-10″
S-7915-S	W-7915-S	96″	2-10″	2-4″	1-10″	2-10″
S-7916-S	W-7916-S	102″	2-10″	2-4″	1-10″	2-10″
S-7917-S	W-7917-S	108″	2-10″	2-4″	1-10″	2-10″

ASSEMBLAGE OF SECTIONS

Number of Boiler		Assemblage
Steam	Water	
S-7909-S	W-7909-S	A-5C-FA-RA-H
S-7910-S	W-7910-S	A-6C-FA-RA-H
S-7911-S	W-7911-S	A-6C-FA-RA-G-H
S-7912-S	W-7912-S	A-7C-FA-RA-G-H
S-7913-S	W-7913-S	A-8C-FA-RA-G-H
S-7914-S	W-7914-S	A-9C-FA-RA-G-H
S-7915-S	W-7915-S	A-8C-FA-RA-C-BW-G-H
S-7916-S	W-7916-S	A-FC-7C-FA-RA-C-BW-2G-H
S-7917-S	W-7917-S	A-FC-8C-FA-RA-C-BW-2G-H

A = Front Section.
FC = Front Center Section.
C = Center Section.
FA = Front Secondary Air Section.
RA = Rear Secondary Air Section.
BW = Bridgewall Section.
G = Open Center Section.
H = Back Section.

Ideal Smokeless Boilers
Ash Pit Dimensions



29″ Ideal Smokeless Boiler

Number of Boiler	Dimensions in Inches			
	Depth	"X"	"Y"	"Z"
S or W-2908-S	12	42	23	3
S or W-2909-S	12	48	23	3
S or W-2910-S	12	54	23	3
S or W-2911-S	12	60	23	3

36″ Ideal Smokeless Boiler

Number of Boiler	Dimensions in Inches			
	Depth	"X"	"Y"	"Z"
S or W-3608-S	12	42	42	3
S or W-3609-S	12	48	42	3
S or W-3610-S	12	54	42	3
S or W-3611-S	12	60	42	3
S or W-3612-S	12	66	42	3
S or W-3613-S	12	72	42	3
S or W-3614-S	12	78	42	3
S or W-3615-S	12	84	42	3

48″ Ideal Smokeless Boiler

Number of Boiler	Dimensions in Inches			
	Depth	"X"	"Y"	"Z"
S or W-4807-S	12	63	50	2
S or W-4808-S	12	73	50	2
S or W-4809-S	12	73	50	14
S or W-4810-S	12	83	50	14
S or W-4811-S	12	83	50	24
S or W-4812-S	12	83	50	35
S or W-4813-S	12	94	50	35
S or W-4814-S	12	94	50	46

79″ Ideal Smokeless Boiler

Number of Boiler	Dimensions in Inches			
	Depth	"X"	"Y"	"Z"
S or W-7909-S	12	43	74	8
S or W-7910-S	12	49	74	8
S or W-7911-S	12	55	74	8
S or W-7912-S	12	61	74	8
S or W-7913-S	12	67	74	8
S or W-7914-S	12	73	74	8
S or W-7915-S	12	67	74	20
S or W-7916-S	12	73	74	20
S or W-7917-S	12	73	74	26

Arrangement of Grate Bars
Ideal Smokeless Boilers

Boiler Number	Left Front	Right Rear
S or W-2308-S	3	3
S or W-2309-S	4	3
S or W-2310-S	4	4
S or W-2311-S	5	4
S or W-2312-S	5	5

Boiler Number	Left Front	Right Rear
S or W-2907	3	2
S or W-2908	3	3
S or W-2909	4	3
S or W-2910	4	4
S or W-2911	5	4

Boiler Number	Left Front	Right Rear
S or W-3608-S	4	3
S or W-3609-S	4	4
S or W-3610-S	5	4
S or W-3611-S	5	5
S or W-3612-S	6	5
S or W-3613-S	6	6
S or W-3614-S	7	6
S or W-3615-S	7	7

Boiler Number	Left Front	Right Rear	Dead Plates	
			Front	Rear
S or W-4807-S	3	3	. . .	. . .
S or W-4808-S	4	3	. . .	. . .
S or W-4809-S	4	3	1	. . .
S or W-4810-S	4	4	1	. . .
S or W-4811-S	4	4	1	1
S or W-4812-S	4	4	1	2
S or W-4813-S	5	4	1	2
S or W-4814-S	5	4	1	3

Boiler Number	Front Right	Front Left	Rear Right	Rear Left
S or W-7909-S	4	4	3	3
S or W-7910-S	4	4	4	4
S or W-7911-S	5	5	4	4
S or W-7912-S	5	5	5	5
S or W-7913-S	6	6	5	5
S or W-7914-S	6	6	6	6
S or W-7915-S	6	6	5	5
S or W-7916-S	6	6	5	5
S or W-7917-S	6	6	6	6

IDEAL BOILERS

FOR OIL BURNING

Ideal Arco Round Boiler for Oil Burning:

Performance Data A116–117

Ideal Redflash Boiler for Oil Burning:

Description A118–119
Performance Data A120–129
Dimensions—Outlets—Inlets A130–134

Ideal 23, 29 and 36 inch Oil Burning Boilers:

Selection A135
Description A136–137
Performance Data A140–145
Dimensions—Outlets—Inlets A150–155

Ideal 48 and 79 inch Water Tube Boilers for Oil Burning:

Description A138–139
Performance Data A146–149
Dimensions—Outlets—Inlets A156–159
Boiler Sundries A160

IDEAL ARCO ROUND BOILER

For Oil Burning

PERFORMANCE DATA—STEAM BOILERS

Number of Boiler	Actual Boiler Heating Surface Sq. Ft.	BOILER OUTPUT AND BURNER CAPACITY								CHIMNEY	
		3000 Trans. Rate		4000 Trans. Rate		5000 Trans. Rate		6000 Trans. Rate			
		Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs.Oil/Hr.	Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs.Oil/Hr.	Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs.Oil/Hr.	Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs.Oil/Hr.	Size Inches	Height Feet
S-1705-O	19.9	250	4.3	330	5.9	415	7.7	500	9.5	8 x 8	30
S-1905-O	23.7	300	5.1	395	7.0	495	9.2	595	11.3	8 x 8	30
S-2005-O	26.0	325	5.6	435	7.7	540	10.1	650	12.4	8 x 8	30
S-2205-O	28.8	360	6.2	480	8.5	600	11.1	720	13.8	8 x 8	30
S-2505-O	35.8	450	7.7	595	10.6	745	13.8	895	17.1	8 x 8	35
S-2805-O	43.4	545	9.4	725	12.9	905	16.8	1090	20.8	10 x 10	35
S-1706-O	23.1	290	4.8	385	6.6	480	8.6	575	10.6	8 x 8	30
S-1906-O	27.7	350	5.8	460	7.9	575	10.3	695	12.7	8 x 8	30
S-2006-O	30.6	380	6.4	510	8.7	640	11.3	765	14.0	8 x 8	30
S-2206-O	34.3	430	7.1	570	9.8	715	12.7	860	15.7	8 x 8	35
S-2506-O	42.3	530	8.8	705	12.0	885	15.7	1060	19.4	8 x 8	35
S-2806-O	52.4	655	10.9	875	14.9	1090	19.4	1310	24.0	10 x 10	40

*Output at Boiler Nozzle—Sq. Ft. Direct Cast Iron Radiation @ 240 B.t.u. per Sq. Ft. per Hour. See page A10 for boiler selection. For guaranty, see page A11. To the total radiator and piping (240 B.t.u.) load add 25% for pickup or cold starting load—after which select boiler from outputs between the heavy lines.

IDEAL ARCO ROUND BOILER

For Oil Burning

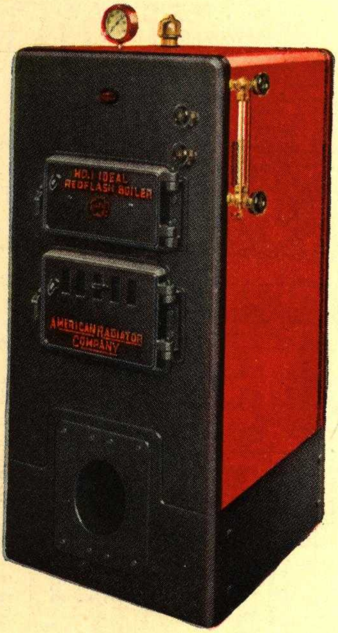
PERFORMANCE DATA—WATER BOILERS

Number of Boiler	Actual Boiler Heating Surface Sq. Ft.	BOILER OUTPUT AND BURNER CAPACITY								CHIMNEY	
		3000 Trans. Rate		4000 Trans. Rate		5000 Trans. Rate		6000 Trans. Rate			
		Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil /Hr.	Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil /Hr.	Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil /Hr.	Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil /Hr.	Size Inches	Height Feet
W-1705-O	18.2	365	3.8	485	5.2	605	6.8	730	8.4	8 x 8	30
W-1905-O	21.8	435	4.6	580	6.3	725	8.2	870	10.1	8 x 8	30
W-2005-O	23.6	470	4.9	630	6.8	785	8.9	945	11.0	8 x 8	30
W-2205-O	26.8	535	5.6	715	7.7	895	10.1	1075	12.5	8 x 8	30
W-2505-O	33.1	660	6.9	885	9.5	1105	12.5	1325	15.4	8 x 8	35
W-2805-O	40.3	805	8.5	1075	11.6	1345	15.2	1615	18.7	10 x 10	35
W-1706-O	21.4	430	4.3	570	5.9	715	7.7	855	9.5	8 x 8	30
W-1906-O	25.8	515	5.2	690	7.1	860	9.3	1030	11.5	8 x 8	30
W-2006-O	28.2	565	5.7	750	7.8	940	10.1	1130	12.6	8 x 8	30
W-2206-O	32.2	645	6.5	860	8.9	1075	11.6	1290	14.4	8 x 8	35
W-2506-O	39.6	790	8.0	1055	11.0	1320	14.3	1585	17.6	8 x 8	35
W-2806-O	49.2	985	10.0	1310	13.6	1640	17.7	1970	21.9	10 x 10	40

*Output at Boiler Nozzle—Sq. Ft. Direct Cast Iron Radiation @ 150 B.t.u. per Sq. Ft. per Hour. See page A10 for boiler selection. For guaranty, see page A11. To the total radiator and piping (150 B.t.u.) load add 25% for pickup or cold starting load—after which select boiler from outputs between the heavy lines.

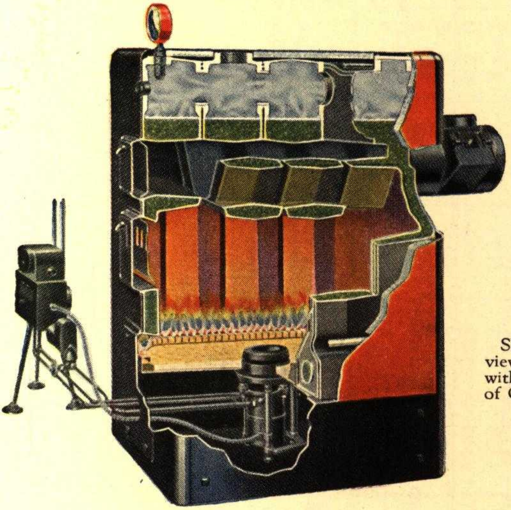
IDEAL REDFLASH BOILER

FOR OIL BURNING

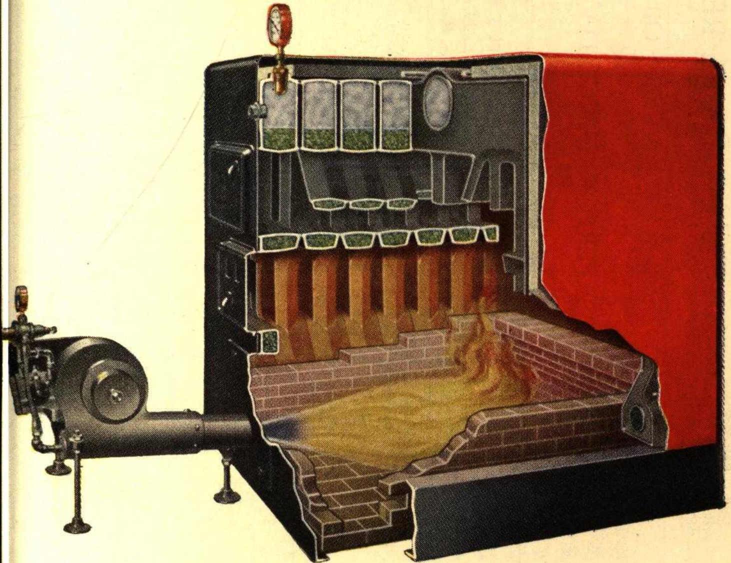


Patents Pending

THIS boiler especially meets the demand of home owners who wish an oil burning boiler that is at once attractive in appearance and efficient in performance. Equipped with any standard make of oil burner, it is ideal for those who wish to utilize their basement as a livable place for work or play. Its beautiful red enamel metal jacket protects adequate insulation of improved asbestocel and the boiler is completely equipped in all other respects.



Showing interior view as equipped with "Hearth" Type of Oil Burner.



Interior view as equipped with "Jet" Type Oil Burner.

NO. 1 IDEAL REDFLASH BOILER

For Oil Burning

PERFORMANCE DATA—STEAM BOILERS

Number of Boiler	Actual Boiler Heating Surface Sq. Ft.	BOILER OUTPUT AND BURNER CAPACITY								CHIMNEY	
		3000 Trans. Rate		4000 Trans. Rate		5000 Trans. Rate		6000 Trans. Rate			
		Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs. Oil /Hr.	Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs. Oil /Hr.	Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs. Oil /Hr.	Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs. Oil /Hr.	Size Inches	Height Feet
1-S- 5-O	21.9	275	4.7	365	6.4	455	8.2	545	10.3	8 x 8	30
1-S- 6-O	25.3	315	5.4	420	7.4	525	9.4	630	11.9	8 x 8	30
1-S- 7-O	30.0	375	6.4	500	8.7	625	11.2	750	14.1	8 x 8	30
1-S- 8-O	33.4	415	7.2	555	9.7	695	12.5	835	15.7	8 x 8	30
1-S- 9-O	38.0	475	8.2	635	11.1	795	14.2	950	17.9	8 x 12	30
1-S-10-O	41.4	520	8.9	690	12.1	865	15.5	1040	19.6	8 x 12	35
1-S-11-O	46.1	575	9.9	770	13.5	960	17.2	1150	21.7	8 x 12	35

*Output at Boiler Nozzle—Sq. Ft. Direct Cast Iron Radiation @ 240 B.t.u. per Sq. Ft. per Hour. See page A10 for boiler selection. For guaranty, see page A11. To the total radiator and piping (240 B.t.u.) load add 25% for pickup or cold starting load—after which select boiler from outputs between the heavy lines.

To the total radiator and piping (240 B.t.u.) load add 25% for pickup or cold starting load
lines.

NO. 1 IDEAL REDFLASH BOILER

For Oil Burning

PERFORMANCE DATA—WATER BOILERS

Number of Boiler	Actual Boiler Heating Surface Sq. Ft.	BOILER OUTPUT AND BURNER CAPACITY								CHIMNEY	
		3000 Trans. Rate		4000 Trans. Rate		5000 Trans. Rate		6000 Trans. Rate			
		Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil /Hr.	Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil /Hr.	Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil /Hr.	Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil /Hr.	Size Inches	Height Feet
1-W- 5-O	21.9	440	4.7	585	6.4	730	8.2	875	10.3	8 x 8	30
1-W- 6-O	25.3	505	5.4	675	7.4	845	9.4	1015	11.9	8 x 8	30
1-W- 7-O	30.0	600	6.4	800	8.7	1000	11.2	1200	14.1	8 x 8	30
1-W- 8-O	33.4	665	7.2	890	9.7	1110	12.5	1335	15.7	8 x 8	30
1-W- 9-O	38.0	760	8.2	1015	11.1	1270	14.2	1520	17.9	8 x 12	30
1-W-10-O	41.4	830	8.9	1105	12.1	1380	15.5	1660	19.6	8 x 12	35
1-W-11-O	46.1	920	9.9	1230	13.5	1535	17.2	1845	21.7	8 x 12	35

*Output at Boiler Nozzle—Sq. Ft. Direct Cast Iron Radiation @ 150 B.t.u. per Sq. Ft. per Hour. See page A10 for boiler selection. For guaranty, see page A11. To the total radiator and piping (150 B.t.u.) load add 25% for pickup or cold starting load—after which select boiler from outputs between the heavy lines.

NO. 2 IDEAL REDFLASH BOILER

For Oil Burning

PERFORMANCE DATA—STEAM BOILERS

Number of Boiler	Actual Boiler Heating Surface Sq. Ft.	BOILER OUTPUT AND BURNER CAPACITY								CHIMNEY	
		3000 Trans. Rate		4000 Trans. Rate		5000 Trans. Rate		6000 Trans. Rate			
		Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs. Oil/Hr.	Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs. Oil/Hr.	Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs. Oil/Hr.	Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs. Oil/Hr.	Size Inches	Height Feet
2-S- 6-O	49.2	615	10.5	820	14.4	1020	18.3	1230	23.2	8 x 12	30
2-S- 7-O	57.1	715	12.3	950	16.7	1190	21.3	1430	27.0	12 x 12	30
2-S- 8-O	64.9	810	13.9	1080	19.0	1350	24.2	1620	30.6	12 x 12	35
2-S- 9-O	72.9	910	15.6	1220	21.3	1520	27.2	1820	34.4	12 x 12	35
2-S-10-O	80.8	1010	17.4	1350	23.6	1680	30.2	2020	38.2	12 x 12	40
2-S-11-O	88.8	1110	19.1	1480	26.0	1850	33.1	2220	41.8	12 x 16	40
2-S-12-O	96.7	1210	20.8	1610	28.3	2020	36.1	2420	45.7	12 x 16	40
2-S-13-O	104.6	1310	22.4	1740	30.6	2180	39.1	2620	49.3	12 x 16	40

*Output at Boiler Nozzle—Sq. Ft. Direct Cast Iron Radiation @ 240 B.t.u. per Sq. Ft. per Hour. See page A10 for boiler selection. For guaranty, see page A11. To the total radiator and piping (240 B.t.u.) load add 25% for pickup or cold starting load—after which select boiler from outputs between the heavy lines.

NO. 2 IDEAL REDFLASH BOILER

For Oil Burning

PERFORMANCE DATA—WATER BOILERS

Number of Boiler	Actual Boiler Heating Surface Sq. Ft.	BOILER OUTPUT AND BURNER CAPACITY								CHIMNEY	
		3000 Trans. Rate		4000 Trans. Rate		5000 Trans. Rate		6000 Trans. Rate			
		Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil /Hr.	Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil /Hr.	Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil /Hr.	Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil /Hr.	Size Inches	Height Feet
2-W- 6-O	49.2	985	10.5	1310	14.4	1640	18.3	1970	23.2	8 x 12	30
2-W- 7-O	57.1	1140	12.3	1520	16.7	1910	21.3	2280	27.0	12 x 12	30
2-W- 8-O	64.9	1300	13.9	1730	19.0	2160	24.2	2600	30.6	12 x 12	35
2-W- 9-O	72.9	1460	15.6	1940	21.3	2430	27.2	2920	34.4	12 x 12	35
2-W-10-O	80.8	1620	17.4	2160	23.6	2690	30.2	3240	38.2	12 x 12	40
2-W-11-O	88.8	1780	19.1	2370	26.0	2960	33.1	3550	41.8	12 x 16	40
2-W-12-O	96.7	1940	20.8	2580	28.3	3220	36.1	3870	45.7	12 x 16	40
2-W-13-O	104.6	2090	22.4	2790	30.6	3490	39.1	4180	49.3	12 x 16	40

*Output at Boiler Nozzle—Sq. Ft. Direct Cast Iron Radiation @ 150 B.t.u. per Sq. Ft. per Hour. See page A10 for boiler selection. For guaranty, see page A11. To the total radiator and piping (150 B.t.u.) load add 25% for pickup or cold starting load—after which select boiler from outputs between the heavy lines.

NO. 3 IDEAL REDFLASH BOILER

For Oil Burning

PERFORMANCE DATA—STEAM BOILERS

Number of Boiler	Actual Boiler Heating Surface Sq. Ft.	BOILER OUTPUT AND BURNER CAPACITY								CHIMNEY	
		3000 Trans. Rate		4000 Trans. Rate		5000 Trans. Rate		6000 Trans. Rate			
		Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs. Oil /Hr.	Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs. Oil /Hr.	Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs. Oil /Hr.	Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs. Oil /Hr.	Size Inches	Height Feet
3-S- 8-O	105.5	1320	22.6	1760	30.8	2200	39.4	2640	49.7	12 x 16	40
3-S- 9-O	119.2	1490	25.6	1990	34.8	2480	44.5	2980	56.2	12 x 16	45
3-S-10-O	132.9	1660	28.5	2220	38.8	2770	49.5	3320	62.5	16 x 16	45
3-S-11-O	146.6	1830	31.5	2440	42.8	3060	54.7	3660	69.1	16 x 16	45
3-S-12-O	159.8	2000	34.3	2660	46.7	3330	59.7	4000	75.2	16 x 16	45
3-S-13-O	173.6	2170	37.2	2890	50.7	3620	64.8	4340	81.7	16 x 16	50
3-S-14-O	187.3	2340	40.2	3120	54.7	3900	69.9	4680	88.3	16 x 20	50

*Output at Boiler Nozzle—Sq. Ft. Direct Cast Iron Radiation @ 240 B.t.u. per Sq. Ft. per Hour. See page A 10 for boiler selection. For guaranty, see page A11. To the total radiator and piping (240 B.t.u.) load add 25% for pickup or cold starting load—after which select boiler from outputs between the heavy lines.

NO. 3 IDEAL REDFLASH BOILER

For Oil Burning

PERFORMANCE DATA—WATER BOILERS

Number of Boiler	Actual Boiler Heating Surface Sq. Ft.	BOILER OUTPUT AND BURNER CAPACITY								CHIMNEY	
		3000 Trans. Rate		4000 Trans. Rate		5000 Trans. Rate		6000 Trans. Rate			
		Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil /Hr.	Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil /Hr.	Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil /Hr.	Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil /Hr.	Size Inches	Height Feet
3-W- 8-O	105.5	2110	22.6	2810	30.8	3520	39.4	4220	49.7	12 x 16	40
3-W- 9-O	119.2	2380	25.6	3180	34.8	3970	44.5	4770	56.2	12 x 16	45
3-W-10-O	132.9	2660	28.5	3540	38.8	4430	49.5	5320	62.5	16 x 16	45
3-W-11-O	146.6	2930	31.5	3910	42.6	4880	54.7	5860	69.1	16 x 16	45
3-W-12-O	159.8	3200	34.3	4260	46.7	5320	59.7	6390	75.2	16 x 16	45
3-W-13-O	173.6	3470	37.2	4630	50.7	5780	64.8	6940	81.7	16 x 16	50
3-W-14-O	187.3	3750	40.2	5000	54.7	6250	69.9	7490	88.3	16 x 20	50

*Output at Boiler Nozzle—Sq. Ft. Direct Cast Iron Radiation @ 150 B.t.u. per Sq. Ft. per Hour. See page A10 for boiler selection. For guaranty, see page A11. To the total radiator and piping (150 B.t.u.) load add 25% for pickup or cold starting load—after which select boiler from outputs between the heavy lines.

NO. 4 IDEAL REDFLASH BOILER

For Oil Burning

PERFORMANCE DATA—STEAM BOILERS

Number of Boiler	Actual Boiler Heating Surface Sq. Ft.	BOILER OUTPUT AND BURNER CAPACITY								CHIMNEY	
		3000 Trans. Rate		4000 Trans. Rate		5000 Trans. Rate		6000 Trans. Rate			
		Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs. Oil/Hr.	Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs. Oil/Hr.	Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs. Oil/Hr.	Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs. Oil/Hr.	Size Inches	Height Feet
4-S- 9-O	169	2110	36.2	2810	49.3	3520	63.0	4220	79.6	16 x 16	45
4-S-10-O	189	2360	40.5	3140	55.0	3930	70.3	4710	88.9	16 x 16	50
4-S-11-O	208	2600	44.7	3470	60.8	4340	77.7	5210	98.2	16 x 20	50
4-S-12-O	228	2850	48.9	3800	66.5	4750	85.1	5700	107.5	16 x 20	55
4-S-13-O	248	3100	53.2	4130	72.3	5160	92.5	6190	116.8	16 x 20	55
4-S-14-O	267	3340	57.5	4460	78.1	5570	99.8	6690	126.1	20 x 20	55

*Output at Boiler Nozzle—Sq. Ft. Direct Cast Iron Radiation @ 240 B.t.u. per Sq. Ft. per Hour. See page A10 for boiler selection. For guaranty, see page A11. To the total radiator and piping (240 B.t.u.) load add 25% for pickup or cold starting load—after which select boiler from outputs between the heavy lines.

NO. 4 IDEAL REDFLASH BOILER

For Oil Burning

PERFORMANCE DATA—WATER BOILERS

Number of Boiler	Actual Boiler Heating Surface Sq. Ft.	BOILER OUTPUT AND BURNER CAPACITY								CHIMNEY	
		3000 Trans. Rate		4000 Trans. Rate		5000 Trans. Rate		6000 Trans. Rate			
		Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil/Hr.	Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil/Hr.	Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil/Hr.	Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil/Hr.	Size Inches	Height Feet
4-W- 9-O	169	3380	36.2	4500	49.3	5620	63.0	6750	79.6	16 x 16	45
4-W-10-O	189	3770	40.5	5030	55.0	6280	70.3	7540	88.9	16 x 16	50
4-W-11-O	208	4170	44.7	5560	60.8	6940	77.7	8330	98.2	16 x 20	50
4-W-12-O	228	4560	48.9	6080	66.5	7600	85.1	9120	107.5	16 x 20	55
4-W-13-O	248	4950	53.2	6610	72.3	8260	92.5	9910	116.8	16 x 20	55
4-W-14-O	267	5350	57.5	7140	78.1	8920	99.8	10700	126.1	20 x 20	55

*Output at Boiler Nozzle—Sq. Ft. Direct Cast Iron Radiation @ 150 B.t.u. per Sq. Ft. per Hour. See page A10 for boiler selection. For guaranty, see page A11. To the total radiator and piping (150 B.t.u.) load add 25% for pickup or cold starting load—after which select boiler from outputs between the heavy lines.

NO. 5 IDEAL REDFLASH BOILER

For Oil Burning

PERFORMANCE DATA—STEAM BOILERS

Number of Boiler	Actual Boiler Heating Surface Sq. Ft.	BOILER OUTPUT AND BURNER CAPACITY								CHIMNEY	
		3000 Trans. Rate		4000 Trans. Rate		5000 Trans. Rate		6000 Trans. Rate			
		Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs. Oil /Hr.	Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs. Oil /Hr.	Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs. Oil /Hr.	Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs. Oil /Hr.	Size Inches	Height Feet
5-S-10-O	265	3310	56.8	4420	77.3	5510	98.7	6620	125.0	20 x 20	50
5-S-11-O	293	3660	62.9	4880	85.6	6110	109.4	7330	138.2	20 x 20	55
5-S-12-O	331	4130	71.0	5520	96.5	6890	123.4	8270	156.0	20 x 20	55
5-S-13-O	359	4490	77.1	5980	105.0	7480	134.0	8980	169.4	20 x 20	60
5-S-14-O	386	4830	83.0	6440	113.0	8050	144.1	9660	182.1	20 x 24	60
5-S-15-O	415	5180	89.0	6910	121.0	8640	154.6	10370	195.5	20 x 24	65
5-S-16-O	442	5520	94.8	7360	129.0	9200	164.7	11040	208.2	20 x 24	65
5-S-17-O	469	5860	100.5	7810	137.0	9760	174.9	11720	221.0	20 x 24	70

*Output at Boiler Nozzle—Sq. Ft. Direct Cast Iron Radiation @ 240 B.t.u. per Sq. Ft. per Hour. See page A10 for boiler selection. For guaranty, see page A11. To the total radiator and piping (240 B.t.u.) load add 25% for pickup or cold starting load—after which select boiler from outputs between the heavy lines.

NO. 5 IDEAL REDFLASH BOILER

For Oil Burning

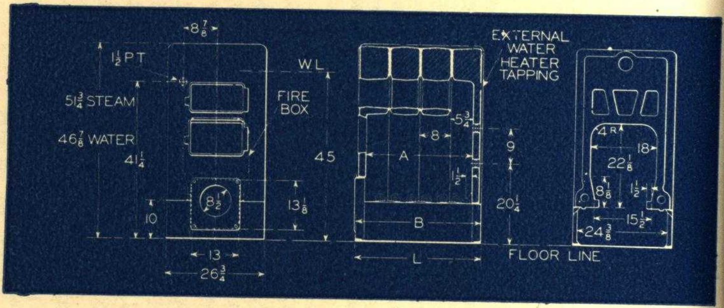
PERFORMANCE DATA—WATER BOILERS

Number of Boiler	Actual Boiler Heating Surface Sq. Ft.	BOILER OUTPUT AND BURNER CAPACITY								CHIMNEY	
		3000 Trans. Rate		4000 Trans. Rate		5000 Trans. Rate		6000 Trans. Rate			
		Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil /Hr.	Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil /Hr.	Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil /Hr.	Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil /Hr.	Size Inches	Height Feet
5-W-10-O	265	5290	56.8	7060	77.3	8820	98.7	10590	125.0	20 x 20	50
5-W-11-O	293	5860	62.9	7820	85.6	9770	109.4	11720	138.2	20 x 20	55
5-W-12-O	331	6610	71.0	8820	96.5	11030	123.4	13230	156.0	20 x 20	55
5-W-13-O	359	7180	77.1	9570	105.0	11990	134.0	14370	169.4	20 x 20	60
5-W-14-O	386	7720	83.0	10300	113.0	12900	144.1	15440	182.1	20 x 24	60
5-W-15-O	415	8290	89.0	11050	121.0	13830	154.6	16580	195.5	20 x 24	65
5-W-16-O	442	8830	94.8	11780	129.0	14730	164.7	17660	208.2	20 x 24	65
5-W-17-O	469	9370	100.5	12500	137.0	15630	174.9	18740	221.0	20 x 24	70

*Output at Boiler Nozzle—Sq. Ft. Direct Cast Iron Radiation @ 150 B.t.u. per Sq. Ft. per Hour. See page A10 for boiler selection. For guaranty, see page A11. To the total radiator and piping (150 B.t.u.) load add 25% for pickup or cold starting load—after which select boiler from outputs between the heavy lines.

No. 1 Ideal Redflash Boiler for Oil Burning—Steam and Water

Dimensions—Outlets—Inlets



Number of Boiler		"L" Length Inches	Outlets Number and Size	Inlets Number and Size
Steam	Water			
1-S-5	1-W-5	20	1-3″	2-2″
1-S-6	1-W-6	24	2-3″	2-2″
1-S-7	1-W-7	28	2-3″	2-2″
1-S-8	1-W-8	32	2-3″	2-2″
1-S-9	1-W-9	36	2-3″	2-2″
1-S-10	1-W-10	40	3-3″	2-2″
1-S-11	1-W-11	44	3-3″	2-2″

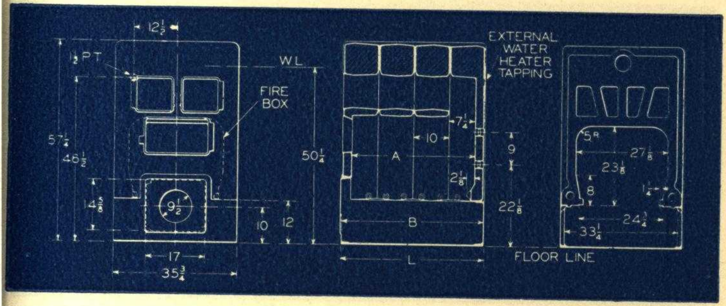
ASSEMBLAGE OF SECTIONS

Number of Boiler	Assemblage
1-S or W-5	A-FC-BX
1-S or W-6	F-CX-BX
1-S or W-7	A-FCX-C-BX
1-S or W-8	F-CX-C-BX
1-S or W-9	A-FC-CX-C-BX
1-S or W-10	F-CX-C-CX-BX
1-S or W-11	A-FCX-C-CX-C-BX

A = 4″-Front Section.
F = 8″-Front Section.
BX = Back Connecting Section.
C = Center Section.
CX = Center Connecting Section.
FC = Front Center Section.
FCX = Front Center Connecting Section.

No. 2 Ideal Redflash Boiler for Oil Burning—Steam and Water

Dimensions—Outlets—Inlets



Number of Boiler		"L" Length Inches	Outlets Number and Size	Inlets Number and Size
Steam	Water			
2-S-6	2-W-6	30	2-4″	2-4″
2-S-6	2-W-7	35	2-4″	2-4″
2-S-8	2-W-8	40	2-4″	2-4″
2-S-9	2-W-9	45	2-4″	2-4″
2-S-10	2-W-10	50	2-4″	2-4″
2-S-11	2-W-11	55	3-4″	2-4″
2-S-12	2-W-12	60	3-4″	2-4″
2-S-13	2-W-13	65	4-4″	2-4″

ASSEMBLAGE OF SECTIONS

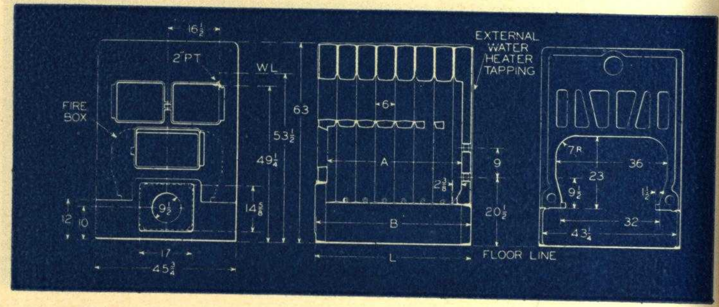
Number of Boiler	Assemblage
2-S or W-6	F-CX-BX
2-S or W-7	A-FCX-C-BX
2-S or W-8	F-CX-C-BX
2-S or W-9	A-FCX-C-C-BX
2-S or W-10	F-CX-C-C-BX
2-S or W-11	A-FCX-C-CX-C-BX
2-S or W-12	F-CX-C-C-RCX-BX
2-S or W-13	A-FCX-C-CX-C-RCX-BX

A = 5″ Front Section.
F = 10″ Front Section.
CX = Front Center Connecting Section.
C = Center Section.

CX = Center Connecting Section.
RCX = Rear Center Connecting Section.
BX = Back Connecting Section.

No. 3 Ideal Redflash Boiler for Oil Burning—Steam and Water

Dimensions—Outlets—Inlets



Number of Boiler		"L" Length Inches	Outlets Number and Size	Inlets Number and Size
Steam	Water			
3-S-8	3-W-8	48	3-4″	2-5″
3-S-9	3-W-9	54	4-4″	2-5″
3-S-10	3-W-10	60	4-4″	2-5″
3-S-11	3-W-11	66	4-4″	2-5″
3-S-12	3-W-12	72	5-4″	2-5″
3-S-13	3-W-13	78	5-4″	2-5″
3-S-14	3-W-14	84	6-4″	2-5″

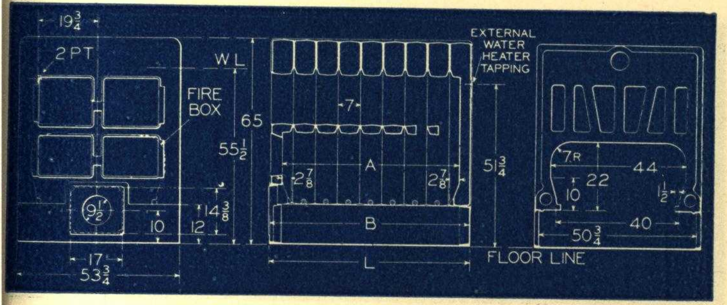
ASSEMBLAGE OF SECTIONS

Number of Boiler	Assemblage
3-S or W-8	F-FCX-C-C-CX-RC-RCX-B
3-S or W-9	F-FCX-C-CX-C-CX-RC-RCX-B
3-S or W-10	F-FCX-C-CX-C-CX-C-RCX-RC-B
3-S or W-11	F-FCX-C-CX-C-C-CX-C-RC-RCX-B
3-S or W-12	F-FCX-C-C-CX-C-CX-C-CX-RC-RCX-B
3-S or W-13	F-FCX-C-C-CX-C-C-CX-C-CX-RC-RCX-B
3-S or W-14	F-FCX-C-CX-C-CX-C-C-CX-C-CX-RC-RCX-B

F = Front Section.
FCX = Front Center Connecting Section.
C = Center Section.
B = Back Section.
CX = Center Connecting Section.
RC = Rear Center Section.
RCX = Rear Center Connecting Section.

No. 4 Ideal Redflash Boiler for Oil Burning—Steam and Water

Dimensions—Outlets—Inlets



Number of Boiler		"L" Length Inches	Outlets Number and Size	Inlets Number and Size
Steam	Water			
4-S-9	4-W-9	63	4-4″	2-6″
4-S-10	4-W-10	70	4-4″	2-6″
4-S-11	4-W-11	77	5-4″	2-6″
4-S-12	4-W-12	84	5-4″	2-6″
4-S-13	4-W-13	91	6-4″	2-6″
4-S-14	4-W-14	98	6-4″	2-6″

ASSEMBLAGE OF SECTIONS

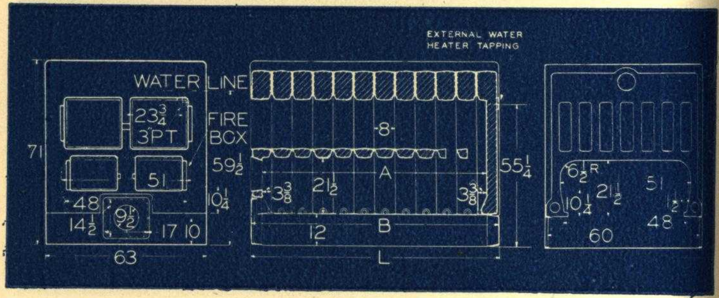
Number of Boiler	Assemblage
4-S or W-9	F-FCX-C-CX-C-CX-RC-RCX-B
4-S or W-10	F-FCX-C-CX-C-CX-C-RCX-RC-B
4-S or W-11	F-FCX-C-CX-C-CX-C-CX-RC-RCX-B
4-S or W-12	F-FCX-C-CX-C-CX-C-CX-RC-RCX-RC-B
4-S or W-13	F-FCX-C-CX-C-CX-C-CX-C-RCX-RC-RCX-B
4-S or W-14	F-FCX-C-CX-C-CX-C-CX-C-CX-RC-RCX-RC-B

F=Front Section.
CX=Front Center Connecting Section.
C=Center Section.
B=Back Section.

CX=Center Connecting Section.
RC=Rear Center Section.
RCX=Rear Center Connecting Section.

No. 5 Ideal Redflash Boiler for Oil Burning—Steam and Water

Dimensions—Outlets—Inlets



Number of Boiler		"L" Length Inches	Outlets Number and Size	Inlets Number and Size
Steam	Water			
5-S-10	5-W-10	80	4-5″	2-6″
5-S-11	5-W-11	88	5-5″	2-6″
5-S-12	5-W-12	96	5-5″	2-6″
5-S-13	5-W-13	104	5-5″	2-6″
5-S-14	5-W-14	112	6-5″	2-6″
5-S-15	5-W-15	120	6-5″	2-6″
5-S-16	5-W-16	128	7-5″	2-6″
5-S-17	5-W-17	136	7-5″	2-6″

ASSEMBLAGE OF SECTIONS

Number of Boiler	Assemblage
5-S or W-10	F-FCX-C-CX-C-C-CX-RC-RCX-B
5-S or W-11	F-FCX-C-CX-C-CX-C-CX-RC-RCX-B
5-S or W-12	F-FCX-C-CX-C-CX-C-CX-C-RCX-RC-B
5-S or W-13	F-FCX-C-CX-C-C-CX-C-CX-C-RC-RCX-B
5-S or W-14	F-FCX-C-CX-C-CX-C-C-CX-C-RCX-RC-RCX-B
5-S or W-15	F-FCX-C-CX-C-C-CX-C-CX-C-C-RCX-RC-RCX-B
5-S or W-16	F-FCX-C-CX-C-CX-C-CX-C-CX-C-RCX-RC-RCX-RC-B
5-S or W-17	F-FCX-C-CX-C-C-CX-C-CX-C-C-RCX-RC-RCX-RC-RCX-B

F = Front Section.
FCX = Front Center Connecting Section.
C = Center Section.
B = Back Section.
CX = Center Connecting Section.
RC = Rear Center Section.
RCX = Rear Center Connecting Section.

SELECTION OF IDEAL OIL BURNING BOILERS

IDEAL Oil Burning Boilers, constructed in accordance with the Low Pressure Heating Boiler Code of the American Society of Mechanical Engineers, are admirably adapted for oil burning for the following reasons:

1. Maximum Heating Surface
2. Numerous Small Flues
3. Long Fire Travel
4. Large Combustion Chamber
5. Gas Tight Construction
6. Special Oil Burner Installing Plates

High Operating Economy

With all the commendable Ideal Boiler features of construction, long life and ease of cleaning, Ideal Oil Burning Boilers constitute a product conducive to exceptional operating economy.

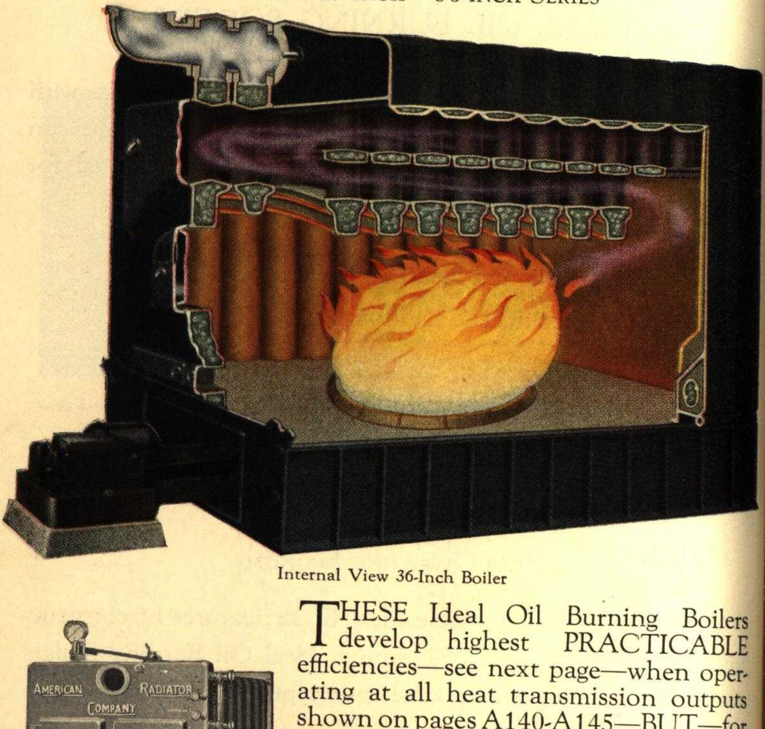
Burner Installing Plates

Special attention is called to the Special Oil Burner Installing Plates. These plates are designed to enable instant removal for inspection, adjustment or repair of the oil burner and to insure a neat workmanlike installation of the burner.

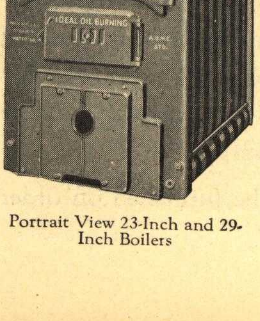
Ideal Oil Burner Installing Plates can be furnished on order for most types of oil burners.

IDEAL OIL BURNING BOILERS

23-INCH—29-INCH—36-INCH SERIES



Internal View 36-Inch Boiler

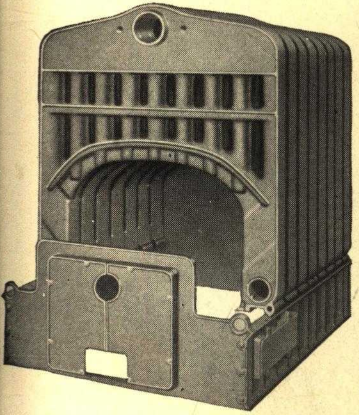


Portrait View 23-Inch and 29-Inch Boilers

THESE Ideal Oil Burning Boilers develop highest PRACTICABLE efficiencies—see next page—when operating at all heat transmission outputs shown on pages A140-A145—BUT—for all-round satisfactory performance and behavior during all winter weathers, select boilers having oil burner outputs as shown between the heavy vertical lines on these pages. For all building heating purposes, Ideal Oil Burning Boilers thus selected will operate economically, efficiently, and most creditably under all the changing requirements of winter, including pick-up or cold starting load. See page A10 on how to select oil burning Ideal Heating Boilers.

IDEAL OIL BURNING BOILERS

23-INCH—29-INCH—36-INCH SERIES

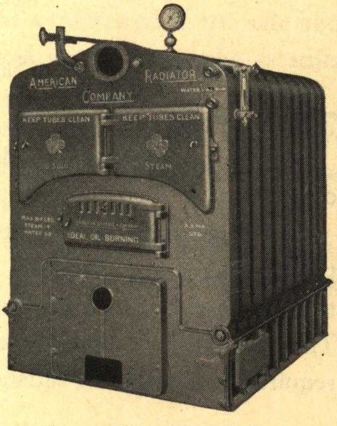


Partly assembled 36-inch Boiler illustrating sectional construction and large heating surface of the numerous tubular water-ways

Abundant Heating Surface Insures Maximum Heat Output

THERE are essentially fifty percent more tubular heat absorbing water-ways in this Ideal Oil Burning Boiler than in regular coal burning boilers. These small numerous water-ways separate the water in the boiler into many thin columns.

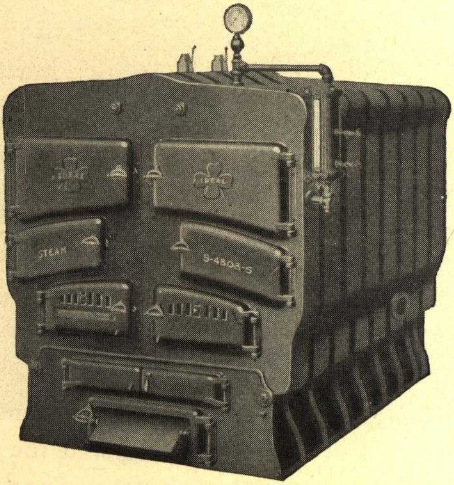
In the long, double travel of the hot gases through the boiler every possible heat unit is extracted by the ample heat absorbing surface of these tubes. And as the smooth interiors of the tubes offer little resistance to the water as it is heated and rises, high efficiency results.



Portrait View 36-Inch Boiler

IDEAL WATER TUBE BOILERS

For Oil Burning



48-Inch Ideal Water Tube Boiler
for Oil Burning

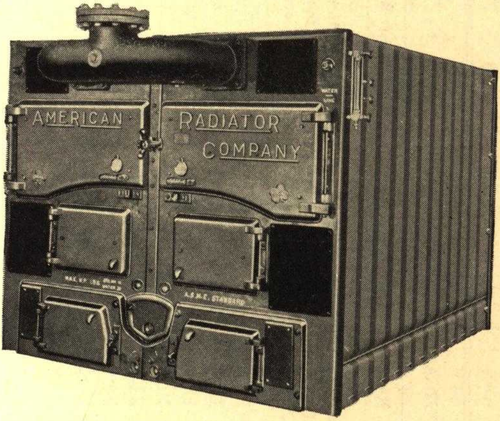
48-INCH—79-INCH SERIES FOR LARGE BUILDINGS

THE 48-inch and 79-inch Ideal Water Tube Boilers for Oil Burning are especially adapted for large buildings—new or old.

The large base and combustion chambers in these boilers provide adequate space for the thorough mixing of air with the atomized oil, insuring complete combustion of the oil fuel. This is a fact of first importance, representing the basic design required in a boiler for satisfactory oil burning. It is being recog-

IDEAL WATER TUBE BOILERS

For Oil Burning



79-Inch Ideal Water Tube Boiler
for Oil Burning

nized increasingly by those especially interested in the sale and purchase of oil burning boilers and accounts for the steadily growing popularity of Ideal Boilers for oil burning.

No building is too large for these boilers. Installed in battery, one or more may be operated at a time according to weather conditions, effecting a real fuel economy.

Contacting faces on all sections and doors are machined, insuring tight construction, cleanliness and permanent operating economy.

23-INCH IDEAL OIL BURNING BOILER

PERFORMANCE DATA—STEAM

Number of Boiler	Actual Boiler Heating Surface Sq. Ft.	BOILER OUTPUT AND BURNER CAPACITY								CHIMNEY	
		3000 Trans. Rate		4000 Trans. Rate		5000 Trans. Rate		6000 Trans. Rate			
		Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs. Oil/Hr.	Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs. Oil/Hr.	Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs. Oil/Hr.	Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs. Oil/Hr.	Size Inches	Height Feet
S-0623	52.6	660	10.9	880	14.9	1095	19.5	1315	24.1	8 x 8	30
S-0723	61.3	765	12.7	1020	17.4	1275	22.7	1530	28.1	8 x 8	30
S-0823	70.0	875	14.5	1165	19.9	1460	25.9	1750	32.1	8 x 12	30
S-0923	78.7	985	16.4	1310	22.4	1640	29.1	1970	36.0	8 x 12	35
S-1023	87.4	1090	18.2	1455	24.8	1820	32.3	2185	40.0	8 x 12	35
S-1123	96.1	1200	20.0	1600	27.3	2000	35.6	....	.....	12 x 12	35
S-1223	104.8	1310	21.8	1745	29.8	2180	38.8	....	.....	12 x 12	35
S-1323	113.5	1420	23.6	1890	32.2	....	.....	....	.....	12 x 12	35
S-1423	122.2	1530	25.4	2040	34.7	....	.....	....	.....	12 x 12	35

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*Output at Boiler Nozzle—Sq. Ft. Direct Cast Iron Radiation @ 240 B.t.u. per Sq. Ft. per Hour. See page A10 for boiler selection. For guaranty, see page A11. To the total radiator and piping (240 B.t.u.) load add 25% for pickup or cold starting load—after which select boiler from outputs between the heavy lines.

23-INCH IDEAL OIL BURNING BOILER

PERFORMANCE DATA—WATER

Number of Boiler	Actual Boiler Heating Surface Sq. Ft.	BOILER OUTPUT AND BURNER CAPACITY								CHIMNEY	
		3000 Trans. Rate		4000 Trans. Rate		5000 Trans. Rate		6000 Trans. Rate			
		Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil/Hr.	Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil/Hr.	Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil/Hr.	Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil/Hr.	Size Inches	Height Feet
W-0623	52.6	1050	10.9	1400	14.9	1750	19.5	2100	24.1	8 x 8	30
W-0723	61.3	1225	12.7	1635	17.4	2040	22.7	2450	28.1	8 x 8	30
W-0823	70.0	1400	14.5	1865	19.9	2330	25.9	2800	32.1	8 x 12	30
W-0923	78.7	1575	16.3	2100	22.4	2620	29.1	3150	36.0	8 x 12	35
W-1023	87.4	1750	18.1	2330	24.8	2910	32.3	3500	40.0	8 x 12	35
W-1123	96.1	1920	19.9	2560	27.3	3200	35.6	3840	44.0	12 x 12	35
W-1223	104.8	2095	21.7	2795	29.8	3490	38.8	4190	48.0	12 x 12	35
W-1323	113.5	2270	23.6	3025	32.2	3780	42.0	4540	52.0	12 x 12	35
W-1423	122.2	2445	25.4	3260	34.7	4070	45.2	4890	55.9	12 x 12	35

*Output at Boiler Nozzle—Sq. Ft. Direct Cast Iron Radiation @ 150 B.t.u. per Sq. Ft. per Hour. See page A10 for boiler selection. For guaranty, see page A11. To the total radiator and piping (150 B.t.u.) load add 25% for pickup or cold starting load—after which select boiler from outputs between the heavy lines.

29-INCH IDEAL OIL BURNING BOILER

PERFORMANCE DATA—STEAM

Number of Boiler	Actual Boiler Heating Surface Sq. Ft.	BOILER OUTPUT AND BURNER CAPACITY								CHIMNEY	
		3000 Trans. Rate		4000 Trans. Rate		5000 Trans. Rate		6000 Trans. Rate			
		Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs. Oil/Hr.	Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs. Oil/Hr.	Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs. Oil/Hr.	Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs. Oil/Hr.	Size Inches	Height Feet
S-0729	109.0	1360	22.7	1815	30.9	2270	40.3	2720	49.9	12 x 12	35
S-0829	124.9	1560	26.0	2080	35.4	2600	46.2	3120	57.2	12 x 12	35
S-0929	140.8	1760	29.3	2345	40.0	2930	52.1	3520	64.5	12 x 16	40
S-1029	156.7	1960	32.6	2610	44.5	3260	58.0	....	.....	12 x 16	40
S-1129	172.6	2160	35.9	2875	49.0	3595	63.9	....	.....	12 x 16	45
S-1229	188.5	2355	39.2	3140	53.5	....	.....	....	.....	12 x 16	45
S-1329	204.4	2555	42.5	3405	58.1	....	.....	....	.....	16 x 16	50
S-1429	220.3	2755	45.8	3675	62.6	....	.....	....	.....	16 x 16	50

*Output at Boiler Nozzle—Sq. Ft. Direct Cast Iron Radiation @ 240 B.t.u. per Sq. Ft. per Hour. See page A 10 for boiler selection. For guaranty, see page A11. To the total radiator and piping (240 B.t.u.) load add 25% for pickup or cold starting load—after which select boiler from outputs between the heavy lines.

29-INCH IDEAL OIL BURNING BOILER

PERFORMANCE DATA—WATER

Number of Boiler	Actual Boiler Heating Surface Sq. Ft.	BOILER OUTPUT AND BURNER CAPACITY								CHIMNEY	
		3000 Trans. Rate		4000 Trans. Rate		5000 Trans. Rate		6000 Trans. Rate			
		Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil/Hr.	Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil/Hr.	Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil/Hr.	Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil/Hr.	Size Inches	Height Feet
W-0729	109.0	2180	22.6	2910	30.9	3630	40.3	4360	49.9	12 x 12	35
W-0829	124.9	2500	25.9	3330	35.4	4160	46.2	5000	57.2	12 x 12	35
W-0929	140.8	2815	29.2	3750	40.0	4690	52.1	5630	64.5	12 x 16	40
W-1029	156.7	3135	32.5	4180	44.5	5220	58.0	6270	71.7	12 x 16	40
W-1129	172.6	3450	35.8	4600	49.0	5750	63.9	6900	79.0	12 x 16	45
W-1229	188.5	3770	39.1	5030	53.5	6280	69.8	7540	86.3	12 x 16	45
W-1329	204.4	4090	42.5	5450	58.1	6810	75.7	8180	93.6	16 x 16	50
W-1429	220.3	4405	45.8	5870	62.6	7340	81.5	8810	101.0	16 x 16	50

*Output at Boiler Nozzle—Sq. Ft. Direct Cast Iron Radiation @ 150 B.t.u. per Sq. Ft. per Hour. See page A10 for boiler selection. For guaranty, see page A11. To the total radiator and piping (150 B.t.u.) load add 25% for pickup or cold starting load—after which select boiler from outputs between the heavy lines.

36-INCH IDEAL OIL BURNING BOILER

PERFORMANCE DATA—STEAM

Number of Boiler	Actual Boiler Heating Surface Sq. Ft.	BOILER OUTPUT AND BURNER CAPACITY								CHIMNEY	
		3000 Trans. Rate		4000 Trans. Rate		5000 Trans. Rate		6000 Trans. Rate			
		Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs. Oil/Hr.	Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs. Oil/Hr.	Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs. Oil/Hr.	Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs. Oil/Hr.	Size Inches	Height Feet
S-0836	180.4	2255	37.6	3010	51.3	3760	66.8	4510	82.6	16 x 16	40
S-0936	203.4	2540	42.3	3390	57.8	4240	75.3	5090	93.2	16 x 16	45
S-1036	226.4	2830	47.1	3780	64.4	4720	83.8	5660	103.7	16 x 16	50
S-1136	249.4	3120	51.9	4160	70.9	5200	92.3	....	.....	16 x 20	50
S-1236	272.4	3405	56.7	4540	77.5	5675	100.8	....	.....	16 x 20	55
S-1336	295.4	3690	61.5	4920	84.0	....	.....	....	.....	20 x 20	60
S-1436	318.4	3980	66.2	5310	90.5	....	.....	....	.....	20 x 20	60
S-1536	341.4	4265	71.0	5690	97.0	....	.....	....	.....	20 x 20	65

*Output at Boiler Nozzle—Sq. Ft. Direct Cast Iron Radiation @ 240 B.t.u. per Sq. Ft. per Hour. See page A10 for boiler selection. For guaranty, see page A11. To the total radiator and piping (240 B.t.u.) load add 25% for pickup or cold starting load—after which select boiler from outputs between the heavy lines.

PERFORMANCE DATA—WATER

Number of Boiler	Actual Boiler Heating Surface Sq. Ft.	BOILER OUTPUT AND BURNER CAPACITY								CHIMNEY	
		3000 Trans. Rate		4000 Trans. Rate		5000 Trans. Rate		6000 Trans. Rate			
		Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil/Hr.	Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil/Hr.	Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil/Hr.	Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil/Hr.	Size Inches	Height Feet
W-0836	180.4	3610	37.5	4820	51.3	6020	66.8	7220	82.6	16 x 16	40
W-0936	203.4	4070	42.3	5430	57.8	6780	75.3	8140	93.2	16 x 16	45
W-1036	226.4	4530	47.1	6050	64.4	7550	83.8	9060	103.7	16 x 16	50
W-1136	249.4	4990	51.9	6660	70.9	8320	92.3	9980	114.2	16 x 20	50
W-1236	272.4	5450	56.6	7270	77.5	9080	100.8	10900	124.8	16 x 20	55
W-1336	295.4	5910	61.4	7880	84.0	9850	109.3	11820	135.3	20 x 20	60
W-1436	318.4	6370	66.2	8500	90.5	10620	117.8	12740	145.8	20 x 20	60
W-1536	341.4	6830	71.0	9110	97.0	11380	126.3	13660	156.3	20 x 20	65

*Output at Boiler Nozzle—Sq. Ft. Direct Cast Iron Radiation @ 150 B.t.u. per Sq. Ft. per Hour. See page A10 for boiler selection. For guaranty, see page A11. To the total radiator and piping (150 B.t.u.) load add 25% for pickup or cold starting load—after which select boiler from outputs between the heavy lines.

48-INCH IDEAL WATER TUBE BOILER

For Oil Burning

PERFORMANCE DATA—STEAM

Number of Boiler	Actual Boiler Heating Surface Sq. Ft.	BOILER OUTPUT AND BURNER CAPACITY								CHIMNEY	
		3000 Trans. Rate		4000 Trans. Rate		5000 Trans. Rate		6000 Trans. Rate			
		Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs. Oil/Hr.	Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs. Oil/Hr.	Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs. Oil/Hr.	Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs. Oil/Hr.	Size Inches	Height Feet
S-4808-O	334	4170	69.3	5560	94.8	6950	123.6	8340	152.9	20 x 24	60
S-4809-O	379	4730	78.8	6310	107.8	7900	140.4	9480	173.6	20 x 24	65
S-4810-O	426	5320	88.5	7090	121.0	8860	157.7	10630	195.0	24 x 24	70
S-4811-O	472	5900	98.1	7860	134.2	9830	175.0	11800	216.2	24 x 24	75
S-4812-O	517	6470	107.7	8620	147.2	10780	191.8	12930	237.0	24 x 24	80
S-4813-O	564	7050	117.2	9380	160.3	11730	208.8	14100	258.0	24 x 28	85
S-4814-O	610	7630	127.0	10190	173.6	12710	226.3	15270	280.0	24 x 28	90

*Output at Boiler Nozzle—Sq. Ft. Direct Cast Iron Radiation @ 240 B.t.u. per Sq. Ft. per Hour. See page A10 for boiler selection. For guaranty, see page A11. To the total radiator and piping (240 B.t.u.) load add 25% for pickup or cold starting load—after which select boiler from outputs between the heavy lines.

48-INCH IDEAL WATER TUBE BOILER

For Oil Burning

PERFORMANCE DATA—WATER

Number of Boiler	Actual Boiler Heating Surface Sq. Ft.	BOILER OUTPUT AND BURNER CAPACITY								CHIMNEY	
		3000 Trans. Rate		4000 Trans. Rate		5000 Trans. Rate		6000 Trans. Rate			
		Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil/Hr.	Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil/Hr.	Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil/Hr.	Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil/Hr.	Size Inches	Height Feet
W-4808-O	334	6680	69.3	8900	94.8	11130	123.6	13360	152.9	20 x 24	60
W-4809-O	379	7580	78.8	10110	107.8	12630	140.4	15160	173.6	20 x 24	65
W-4810-O	426	8510	88.5	11330	121.0	14190	157.7	17020	195.0	24 x 24	70
W-4811-O	472	9440	98.1	12590	134.2	15740	175.0	18880	216.2	24 x 24	75
W-4812-O	517	10340	107.7	13800	147.2	17240	191.8	20680	237.0	24 x 24	80
W-4813-O	564	11270	117.2	15020	160.3	18790	208.8	22540	258.0	24 x 28	85
W-4814-O	610	12210	127.0	16280	173.6	20340	226.3	24410	280.0	24 x 28	90

*Output at Boiler Nozzle—Sq. Ft. Direct Cast Iron Radiation @ 150 B.t.u. per Sq. Ft. per Hour. See page A10 for boiler selection. For guaranty, see page A11. To the total radiator and piping (150 B.t.u.) load add 25% for pickup or cold starting load—after which select boiler from outputs between the heavy lines.

79-INCH IDEAL WATER TUBE BOILER

For Oil Burning

PERFORMANCE DATA—STEAM

Number of Boiler	Actual Boiler Heating Surface Sq. Ft.	BOILER OUTPUT AND BURNER CAPACITY								CHIMNEY	
		3000 Trans. Rate		4000 Trans. Rate		5000 Trans. Rate		6000 Trans. Rate			
		Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs. Oil/Hr.	Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs. Oil/Hr	Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs. Oil/Hr.	Boiler Output Sq. Ft. *Steam	Minimum Burner Capacity Lbs. Oil/Hr.	Size Inches	Height Feet
S-7909-O	490	6130	102	8170	139	10210	182	12260	224	24 x 24	80
S-7910-O	546	6820	113	9090	155	11360	202	13640	250	24 x 24	85
S-7911-O	601	7510	125	10010	171	12510	222	15020	275	24 x 28	90
S-7912-O	656	8200	136	10930	187	13670	243	16400	300	24 x 28	95
S-7913-O	711	8890	148	11850	202	14820	264	17780	325	24 x 28	100
S-7914-O	767	9580	159	12780	218	15980	284	19170	351	28 x 28	105
S-7915-O	822	10280	171	13700	234	17130	305	20550	376	28 x 28	110
S-7916-O	877	10970	182	14620	249	18290	325	21930	402	28 x 28	115
S-7917-O	933	11660	194	15530	265	19440	346	23320	427	28 x 28	120

*Output at Boiler Nozzle—Sq. Ft. Direct Cast Iron Radiation @240 B.t.u. per Sq. Ft. per Hour. See page A10 for boiler selection. For guaranty, see page A11. To the total radiator and piping (240 B.t.u.) load add 25% for pickup or cold starting load—after which select boiler from outputs between the heavy lines.

79-INCH IDEAL WATER TUBE BOILER

For Oil Burning

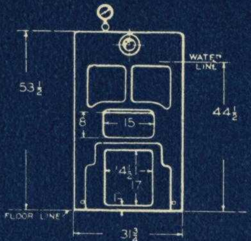
PERFORMANCE DATA—WATER

Number of Boiler	Actual Boiler Heating Surface Sq. Ft.	BOILER OUTPUT AND BURNER CAPACITY								CHIMNEY	
		3000 Trans. Rate		4000 Trans. Rate		5000 Trans. Rate		6000 Trans. Rate			
		Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil/Hr.	Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil/Hr.	Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil/Hr.	Boiler Output Sq. Ft. *Water	Minimum Burner Capacity Lbs. Oil/Hr.	Size Inches	Height Feet
W-7909-O	490	9800	102	13080	139	16350	182	19600	224	24 x 24	80
W-7910-O	546	10910	113	14550	155	18190	202	21820	250	24 x 24	85
W-7911-O	601	12000	125	16030	171	20040	222	24000	275	24 x 28	90
W-7912-O	656	13120	136	17500	187	21880	243	26240	300	24 x 28	95
W-7913-O	711	14220	148	18980	202	23720	264	28440	325	24 x 28	100
W-7914-O	767	15330	159	20450	218	25570	284	30660	351	28 x 28	105
W-7915-O	822	16440	171	21930	234	27410	305	32880	376	28 x 28	110
W-7916-O	877	17550	182	23400	249	29250	325	35100	402	28 x 28	115
W-7917-O	933	18650	194	24870	265	31090	346	37300	427	28 x 28	120

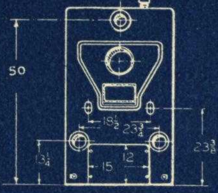
*Output at Boiler Nozzle—Sq. Ft. Direct Cast Iron Radiation @ 150 B.t.u. per Sq. Ft. per Hour. See page A10 for boiler selection. For guaranty, see page A11. To the total radiator and piping (150 B.t.u.) load add 25% for pickup or cold starting load—after which select boiler from outputs between the heavy lines.

IDEAL 23-INCH OIL-BURNING BOILERS

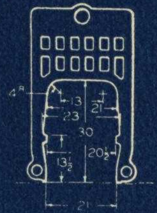
Dimensions—Outlets—Inlets



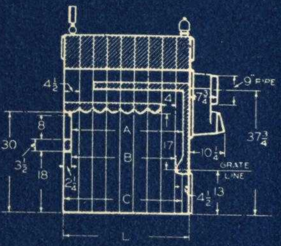
FRONT VIEW SHOWING
MAXIMUM SIZE OF OPENINGS



REAR VIEW



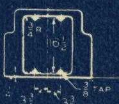
FRONT SECTION REMOVED
SHOWING COMBUSTION CHAMBER

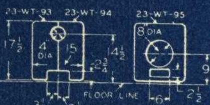


SECTION THROUGH BOILER

DISTANCE FROM FRONT SECTION
TO FACE OF BURNER PLATE-2¼

BURNER PLATES MUST BE ORDERED BY THE PATTERN NUMBER AS LISTED BELOW





IDEAL 23-INCH OIL-BURNING BOILERS
Dimensions—Outlets—Inlets

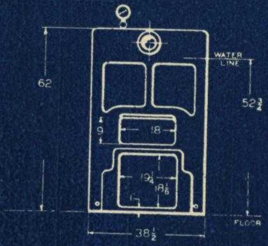
Number of Boiler		Number and Size of Outlets	Number and Size of Inlets	Length "L"	Firebox Dimensions		
Steam	Water				A	B	C
S-0623	W-0623	2-4″	2-4″	25″	20½	18½	22¾
S-0723	W-0723	2-4″	2-4″	29″	24½	22½	26¾
S-0823	W-0823	2-4″	2-4″	33″	28½	26½	30¾
S-0923	W-0923	2-4″	2-4″	37″	32½	30½	34¾
S-1023	W-1023	2-4″	2-4″	41″	36½	34½	38¾
S-1123	W-1123	2-4″	2-4″	45″	40½	38½	42¾
S-1223	W-1223	2-4″	2-4″	49″	44½	42½	46¾
S-1323	W-1323	2-4″	2-4″	53″	48½	46½	50¾
S-1423	W-1423	2-4″	2-4″	57″	52½	50½	54¾

ARRANGEMENT OF SECTIONS

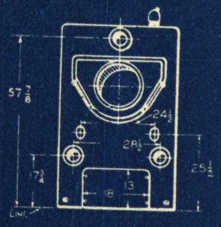
Number of Boiler		Assemblage
Steam	Water	
S-0623	W-0623	A-3C-U-H
S-0723	W-0723	A-4C-U-H
S-0823	W-0823	A-B-4C-U-H
S-0923	W-0923	A-B-5C-U-H
S-1023	W-1023	A-B-5C-2U-H
S-1123	W-1123	A-B-6C-2U-H
S-1223	W-1223	A-B-7C-2U-H
S-1323	W-1323	A-2B-7C-2U-H
S-1423	W-1423	A-2B-8C-2U-H

A = Front Section.
B = Front Center Section.
C = Center Section.
U = Rear Center Uptake Section.
H = Back Section.

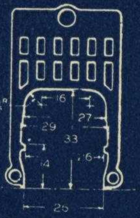
IDEAL 29-INCH OIL-BURNING BOILERS
Dimensions—Outlets—Inlets



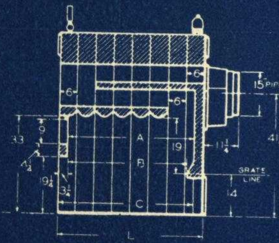
FRONT VIEW SHOWING MAXIMUM SIZE OF OPENINGS



REAR VIEW



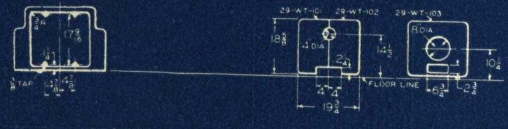
FRONT SECTION REMOVED SHOWING COMBUSTION CHAMBER



SECTION THROUGH BOILER

DISTANCE FROM FRONT SECTION TO FACE OF BURNER PLATE-2½"

BURNER PLATES MUS ORDERED BY THE PATTERN NUMBER AS LISTED BELOW



IDEAL 29-INCH OIL-BURNING BOILERS

Dimensions—Outlets—Inlets

Number of Boiler		Number and Size of Outlets	Number and Size of Inlets	Length "L"	Firebox Dimensions		
Steam	Water				A	B	C
S-0729	W-0729	2-5″	2-5″	42″	35½	33	38¾
S-0829	W-0829	2-5″	2-5″	48″	41½	39	44¾
S-0929	W-0929	2-5″	2-5″	54″	47½	45	50¾
S-1029	W-1029	2-5″	2-5″	60″	53½	51	56¾
S-1129	W-1129	2-5″	2-5″	66″	59½	57	62¾
S-1229	W-1229	2-5″	2-5″	72″	65½	63	68¾
S-1329	W-1329	2-5″	2-5″	78″	71½	69	74¾
S-1429	W-1429	2-5″	2-5″	84″	77½	75	80¾

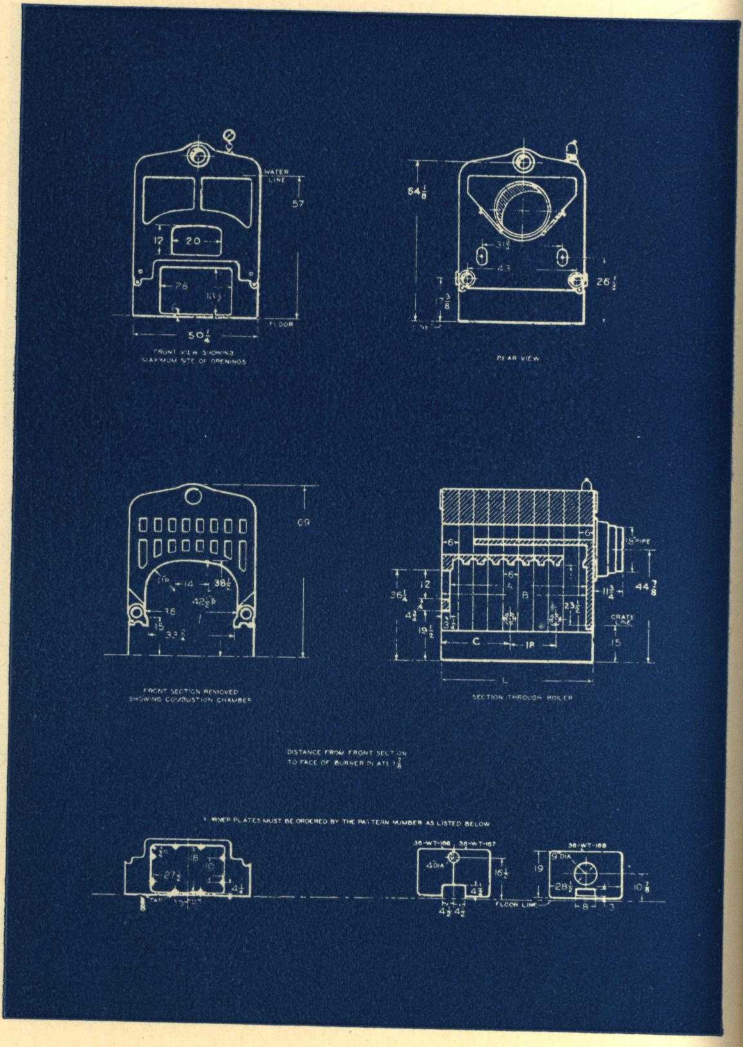
ARRANGEMENT OF SECTIONS

Number of Boiler		Assemblage
Steam	Water	
S-0729	W-0729	A-4C-U-H
S-0829	W-0829	A-B-4C-U-H
S-0929	W-0929	A-B-5C-U-H
S-1029	W-1029	A-B-6C-U-H
S-1129	W-1129	A-B-7C-U-H
S-1229	W-1229	A-B-7C-2U-H
S-1329	W-1329	A-2B-7C-2U-H
S-1429	W-1429	A-2B-8C-2U-H

A = Front Section.
B = Front Center Section.
C = Center Section.
U = Rear Center Uptake Section.
H = Back Section.

IDEAL 36-INCH OIL-BURNING BOILERS

Dimensions—Outlets—Inlets



FRONT VIEW SHOWING MAXIMUM SIZE OF OPENINGS

REAR VIEW

FRONT SECTION REMOVED SHOWING COMBUSTION CHAMBER

SECTION THROUGH BOILER

DISTANCE FROM FRONT SECTION TO FACE OF BURNER PLATE $1\frac{7}{8}$

BURNER PLATES MUST BE ORDERED BY THE PATTERN NUMBER AS LISTED BELOW

IDEAL 36-INCH OIL-BURNING BOILERS

Dimensions—Outlets—Inlets

Number of Boilers		Number and Size of Outlets		Number and Size of Inlets		Length "L"	Firebox Dimensions		
Steam	Water	Steam	Water	Steam	Water		A	B	C
S-0836	W-0836	2-6″	2-6″	2-4″	2-4″, 2-3½″	48″	41½	44¾	27
S-0936	W-0936	2-6″	2-6″	2-4″	2-4″, 2-3½″	54″	47½	50¾	27
S-1036	W-1036	2-6″	2-6″	2-4″	2-4″, 2-3½″	60″	53½	56¾	33
S-1136	W-1136	2-6″	2-6″	2-4″	2-4″, 2-3½″	66″	59½	62¾	33
S-1236	W-1236	2-6″	2-6″	2-4″	2-4″, 4-3½″	72″	65½	68¾	27
S-1336	W-1336	2-6″	2-6″	2-4″	2-4″, 4-3½″	78″	71½	74¾	27
S-1436	W-1436	2-6″	2-6″	2-4″	2-4″, 4-3½″	84″	77½	80¾	33
S-1536	W-1536	2-6″	2-6″	2-4″	2-4″, 4-3½″	90″	83½	86¾	39

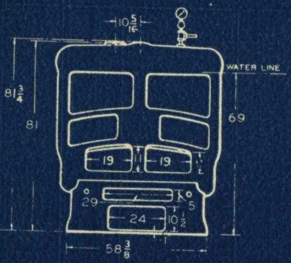
ARRANGEMENT OF SECTIONS

Number of Boiler Steam	Assemblage	Number of Boiler Water	Assemblage
S-0836	A-5C-U-H	W-0836	A-3C-D-C-U-H
S-0936	A-B-5C-U-H	W-0936	A-B-2C-D-2C-U-H
S-1036	A-B-6C-U-H	W-1036	A-B-3C-D-2C-U-H
S-1136	A-B-7C-U-H	W-1136	A-B-3C-D-3C-U-H
S-1236	A-B-7C-2U-H	W-1236	A-B-2C-D-2C-D-2C-U-H
S-1336	A-2B-7C-2U-H	W-1336	A-2B-C-D-2C-D-2C-2U-H
S-1436	A-2B-8C-2U-H	W-1436	A-2B-2C-D-2C-D-2C-2U-H
S-1536	A-2B-9C-2U-H	W-1536	A-2B-3C-D-2C-D-2C-2U-H

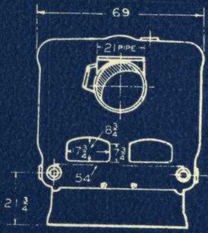
A = Front Section.
B = Front Center Section.
C = Center Section.
D = Center Conn. Sec. with 2-3½ Ret. Tappings.
U = Rear Center Uptake Section.
H = Back Section.

IDEAL 48-INCH WATER TUBE BOILERS FOR OIL BURNING

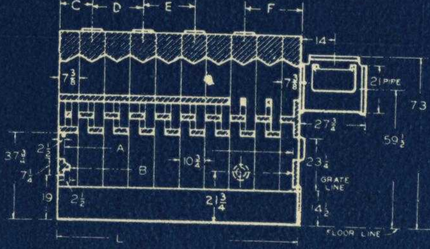
Dimensions—Outlets—Inlets



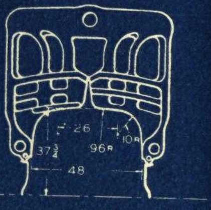
FRONT VIEW SHOWING MAXIMUM SIZE OF OPENINGS



REAR VIEW



SECTION THROUGH BOILER



FRONT SECTION REMOVED SHOWING COMBUSTION CHAMBER

IDEAL 48-INCH WATER TUBE BOILERS FOR OIL BURNING

Dimensions—Outlets—Inlets

Number of Boiler		Number and Size of Outlets		Number and Size of Inlets		Length "L" Inches	Firebox Dimensions					
Steam	Water	Steam	Water	Steam	Water		A	B	C	D	E	F
S-4808-O	W-4808-O	3-6″	3-6″	4-4″	4-6″	79¼	74¾	72¼	12¾	32¼	....	12¾
S-4809-O	W-4809-O	3-6″	3-6″	4-4″	4-6″	90	85½	83	12¾	32¼	....	23½
S-4810-O	W-4810-O	3-6″	3-6″	4-4″	4-6″	100¾	96¼	93¾	12¾	32¼	....	23½
S-4811-O	W-4811-O	4-6″	4-6″	4-4″	4-6″	111½	107	104½	12¾	21½	21½	23½
S-4812-O	W-4812-O	4-6″	4-6″	4-4″	4-6″	122¼	117¾	115¼	12¾	21½	32¼	23½
S-4813-O	W-4813-O	4-6″	4-6″	4-4″	4-6″	133	128½	126	12¾	32¼	32¼	23½
S-4814-O	W-4814-O	4-6″	4-6″	4-4″	4-6″	143¾	139¼	136¾	12¾	32¼	32¼	23½

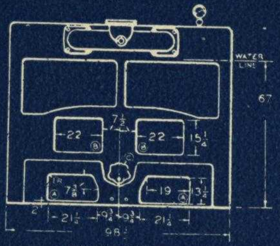
ARRANGEMENT OF SECTIONS

Number of Boiler	Left Hand Side Assemblage	Right Hand Side Assemblage
Steam and Water		
4808-O	A-CX-F-F-NX-F-GX-I	A-K-F-F-F-F-MX-I
4809-O	A-CX-F-F-NX-F-GX-U-I	A-K-F-F-F-F-MX-U-I
4810-O	A-CX-F-F-NX-F-F-GX-U-I	A-K-F-F-F-F-F-MX-U-I
4811-O	A-CX-F-NX-F-NX-F-F-GX-U-I	A-K-F-F-F-F-F-F-MX-U-I
4812-O	A-CX-F-NX-F-F-NX-F-U-GX-U-I	A-K-F-F-F-F-F-F-U-MX-U-I
4813-O	A-CX-X-X-NX-F-F-NX-F-U-GX-U-I	A-K-F-F-F-F-F-F-F-U-MX-U-I
4814-O	A-CX-F-F-NX-F-F-NX-F-F-U-GX-U-I	A-K-F-F-F-F-F-F-F-F-U-MX-U-I

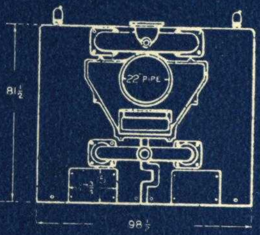
A = Front Section.
K = Closed Front Flue.
CX = Closed Front Flue Connecting (Supply Only).
F = Closed Center Section.
NX = Closed Center Connecting (Supply only).
U = Open Rear Center.
MX = Open Rear Center Connecting (Return Only).
GX = Open Rear Center Connecting (Supply and Return).
I = Open Back Section.

IDEAL 79-INCH WATER TUBE BOILERS FOR OIL BURNING

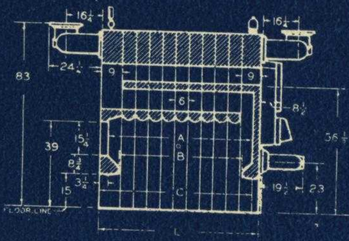
Dimensions—Outlets—Inlets



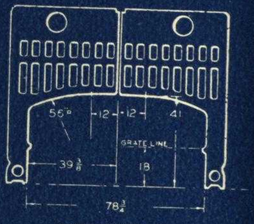
FRONT VIEW SHOWING MAXIMUM SIZE OF OPENINGS



REAR VIEW



SECTION THROUGH BOILER



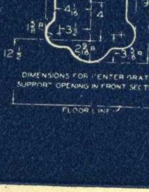
FRONT SECTION REMOVED SHOWING COMBUSTION CHAMBER

A– OIL BURNERS CAN BE INSTALLED THRU ASHPIT DOOR OPENINGS WITHOUT REMOVING THE CENTER GRATE SUPPORT

B– OIL BURNERS CAN BE INSTALLED THRU FIRE DOOR OPENINGS WITHOUT REMOVING THE CENTER GRATE SUPPORT

C– BURNER CAN BE INSTALLED THRU THE CENTER GRATE SUPPORT OPENING IN FRONT SECTION BY REMOVING CONNECTING HEADER AND NIPPLE TAP NIPPLE PORT IN FRONT SECTION AND PLUG SAME

NOTE– OIL BURNING BOILER CAN BE CONVERTED INTO COAL BURNING BOILER BY TAPPING FRONT END OF CENTER GRATE SUPPORT AND CONNECTING TO FRONT SECTION BY MEANS OF PIPING



DIMENSIONS FOR CENTER GRATE SUPPORT OPENING IN FRONT SECTION

IDEAL 79-INCH WATER TUBE BOILERS FOR OIL BURNING

Dimensions—Outlets—Inlets

Number of Boiler		Number and Size of Outlets		Number and Size of Inlets		Length "L"	Firebox Dimensions		
Steam	Water	Steam	Water	Steam	Water		A	B	C
S-7909-O	W-7909-O	2-10″	2-10″	1-4″	2-10″	60″	53½	42½	56¾
S-7910-O	W-7910-O	2-10″	2-10″	1-4″	2-10″	66″	59½	48½	62¾
S-7911-O	W-7911-O	2-10″	2-10″	1-4″	2-10″	72″	65½	54½	68¾
S-7912-O	W-7912-O	2-10″	2-10″	1-4″	2-10″	78″	71½	60½	74¾
S-7913-O	W-7913-O	2-10″	2-10″	1-4″	2-10″	84″	77½	66½	80¾
S-7914-O	W-7914-O	2-10″	2-10″	1-4″	2-10″	90″	83½	72½	86¾
S-7915-O	W-7915-O	2-10″	2-10″	1-4″	2-10″	96″	89½	78½	92¾
S-7916-O	W-7916-O	2-10″	2-10″	1-4″	2-10″	102″	95½	84½	98¾
S-7917-O	W-7917-O	2-10″	2-10″	1-4″	2-10″	108″	101½	90½	104¾

ARRANGEMENT OF SECTIONS

Number of Boiler Steam	Assemblage	Number of Boiler Water	Assemblage
S-7909-O	A-7C-H	W-7909-O	A-7C-H
S-7910-O	A-8C-H	W-7910-O	A-8C-H
S-7911-O	A-9C-H	W-7911-O	A-9C-H
S-7912-O	A-10C-H	W-7912-O	A-10C-H
S-7913-O	A-11C-H	W-7913-O	A-11C-H
S-7914-O	A-12C-H	W-7914-O	A-12C-H
S-7915-O	A-12C-G-H	W-7915-O	A-12C-G-H
S-7916-O	A-FC-11C-2G-H	W-7916-O	A-FC-11C-2G-H
S-7917-O	A-FC-12C-2G-H	W-7917-O	A-FC-12C-2G-H

A=Front Section.
FC=Front Center Section
C=Center Section.
G=Open Center Section.
H=Back Section.

BOILER SUNDRIES

TRIMMINGS

Ideal Boilers are regularly furnished complete with trimmings and equipment as follows:

JACKETED BOILERS

Ideal Redflash—Ideal Arcoflash

Steam:—Ideal Metallic Jacket, Air Cell Insulation, Retard Steam Gauge, Safety Valve, Gauge Glass Fittings, Tri Cocks, Automatic Steam Regulator and Firing Tools.

Water:—Ideal Metallic Jacket, Air Cell Insulation, Combination Altitude Gauge and Thermometer, Automatic Water Regulator (on Ideal Redflash—1 and 2 Series, and Arcoflash, all sizes) and Firing Tools.

UNJACKETED BOILERS

Ideal Water Tube—Ideal Smokeless—Ideal Arco Round

Steam:—Steam Gauge, Safety Valve, Gauge Glass Fittings, Tri Cocks, Flue Brush, Automatic Steam Regulator and Firing Tools.

Water:—Firing Tools.

IDEAL OIL BURNING BOILERS

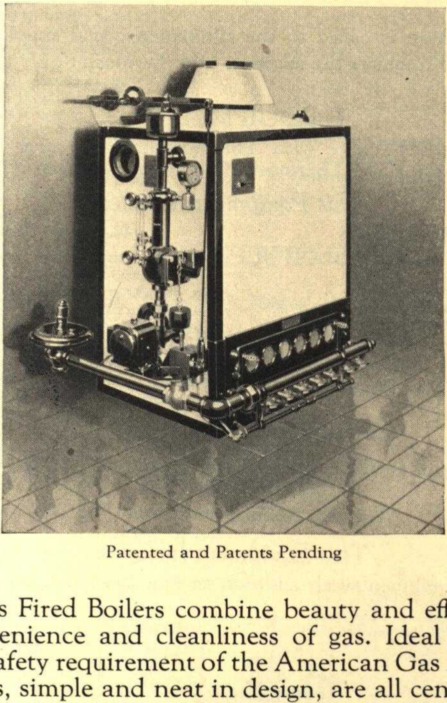
Steam and Water:—Trimmings and equipment furnished are same as corresponding Ideal Coal Burning Boiler except Ideal Oil Burning Boilers are shipped less Grate Bars, Angle Levers, Angle Lever Links, Connecting Bars, Shaker Handle, Regulation, and Firing Tools, but Flue Brush or Flue Scraper is included. Plate Work specially adaptable to installation of Oil Burner is supplied on all types.

BUSHINGS

Additional plugs or bushings, or plugs or bushings of sizes other than those regularly furnished, will be charged for at regular prices.

IDEAL GAS BOILERS

AFFORD CONSTANT, CARE-FREE, AUTOMATIC WARMTH



Patented and Patents Pending

IDEAL Gas Fired Boilers combine beauty and efficiency with the convenience and cleanliness of gas. Ideal Gas Boilers meet every safety requirement of the American Gas Association. The controls, simple and neat in design, are all centered in one valve and are operated entirely mechanically. They are absolutely positive in action and practically wear-proof. Our patented pin type heating section has proved to have the highest degree of heat absorption with the least resistance to the free venting of gases. The section joints are all ground surfaces. This gives a metal-to-metal gas-tight joint without the use of cement or putty. The draft diverters and canopies of vitreous enameled Armco iron are exclusive features of Ideal Gas Boilers.

COMPLETELY up to date and representing the best practice in gas boiler construction and controls—*Ideal Gas Boilers* are suitable for all Steam, Vapor and Hot Water systems as well as Hot Water Supply. They are now available with four types of equipment as given below.

Ideal Gas Boilers are available now with either throttling or snap action control valves. Either valve is available with motor control. The motor control is a motor mounted directly on the valve and operates the valve mechanically.

Especial attention is called to the convenience and simplicity of Motor Equipment which requires the addition of a thermostat only to obtain room temperature control.

T EQUIPMENT

Including Throttling Valve with Thermostatic Pilot, and Shut-off Lever
Requires Motor and Thermostat for Room Temperature Control

This Equipment Includes

STEAM BOILER

No. 596 Throttling Valve
Thermostatic Pilot
No. 611 Low Water Cut-out
No. 905 Arco Steam Regulator
Gas Pressure Governor
Retard Compound Steam Gauge
Pop Safety Valve
Vitreous Enameled Jacket
Vitreous Enameled Draft Diverter
Drain Cocks—Pilot Cock

WATER BOILER

No. 596 Throttling Valve
Thermostatic Pilot
No. 800 Arco Water Regulator
Gas Pressure Governor
Combination Altitude Gauge and Thermometer
Vitreous Enameled Jacket
Vitreous Enameled Draft Diverter
Drain Cocks—Pilot Cock

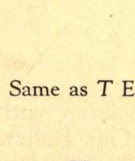
MT EQUIPMENT

Including Throttling Valve with Motor Operated Gas Shut-off and with Thermostatic Pilot

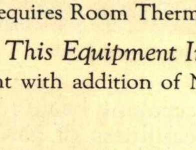
Requires Room Thermostat Only

This Equipment Includes:

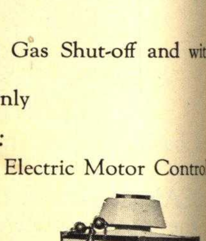
Same as T Equipment with addition of No. 596 Electric Motor Control.



TYPE 0-G



TYPE 1-G



TYPE 4-G

SA EQUIPMENT

Including Snap-Action Valve with Thermostatic Pilot.
Requires motor and thermostat for room temperature control.

This Equipment Includes:

STEAM BOILER

No. 600 Snap-Action Valve
Thermostatic Pilot
No. 611 Low Water Cut-out
No. 905 Arco Steam Regulator
Gas Pressure Governor
Retard Compound Steam Gauge
Pop Safety Valve
Vitreous Enameled Jacket
Vitreous Enameled Draft Diverter
Drain Cocks—Pilot Cock

WATER BOILER

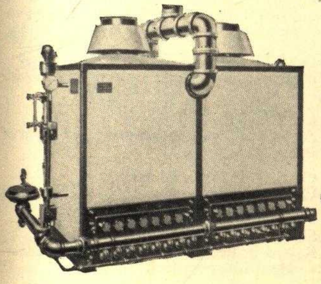
No. 600 Snap-Action Valve
Thermostatic Pilot
No. 800 Arco Water Regulator
Gas Pressure Governor
Combination Altitude Gauge
  and Thermometer
Vitreous Enameled Jacket
Vitreous Enameled Draft Diverter
Drain Cocks—Pilot Cock

MSA EQUIPMENT

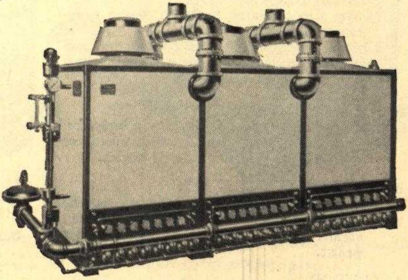
Including Snap-Action Valve with Motor Operated Gas Shut-off and with Thermostatic Pilot
Requires Room Thermostat Only

This Equipment Includes:

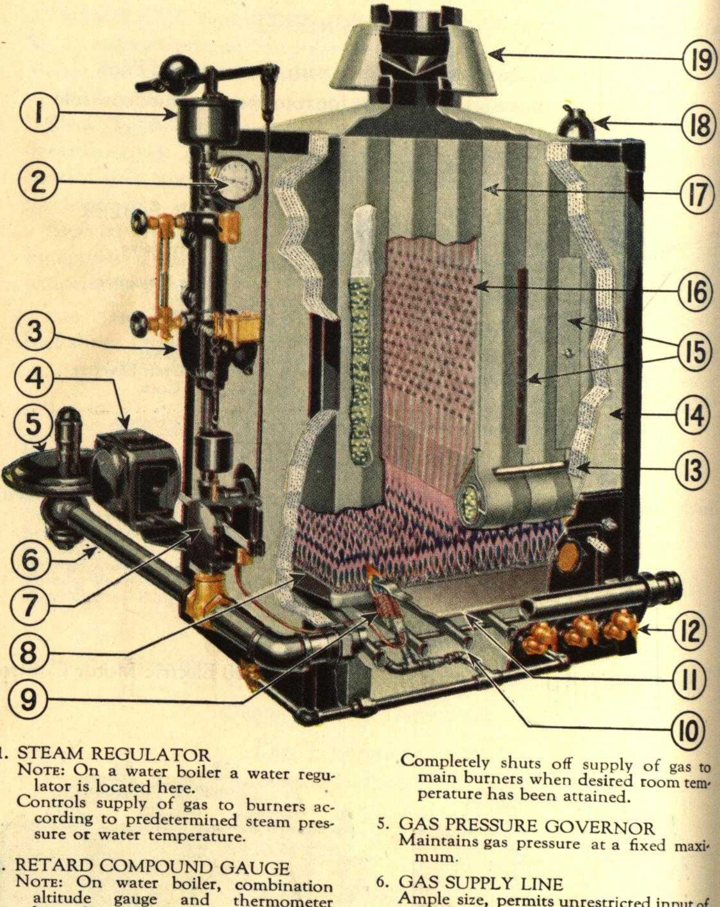
Same as SA Equipment with addition of No. 600 Electric Motor Control.



TYPE 4-G
(Double)



TYPE 4-G
(Triple)



1. STEAM REGULATOR

   Note: On a water boiler a water regulator is located here.

   Controls supply of gas to burners according to predetermined steam pressure or water temperature.

2. RETARD COMPOUND GAUGE

   Note: On water boiler, combination altitude gauge and thermometer located on opposite side of boiler.

3. LOW WATER CUT-OFF

   Completely shuts off supply of gas to main burners if the water line on steam boiler reaches a low danger point.

4. MOTOR

   Operated from the room thermostat. Mounted on and directly connected to No. 596 Throttling Valve or No. 600 Snap Action Valve.

   Completely shuts off supply of gas to main burners when desired room temperature has been attained.

5. GAS PRESSURE GOVERNOR

   Maintains gas pressure at a fixed maximum.

6. GAS SUPPLY LINE

   Ample size, permits unrestricted input of gas.

7. GAS SUPPLY VALVE

   Controls gas to burners. All control functions centered in one valve.

8. SILENT BURNER

   Raised drilled ports. Blue Flame burner. Silent in operation.

9. THERMOSTATIC PILOT

   Protected from moisture or dirt. Keeps gas supply valve closed if pilot is extinguished.

10. VENTURI BURNER TUBE
Induces proper velocity to gas and primary air, and obtains the correct mixture of gas and air.

11. SECONDARY AIR BAFFLE PLATE
Guides the flow of secondary air so that it will pass up through and between the burners assuring proper combustion at the burners.

12. BURNER COCK
Provides individual hand control of gas supply to each burner.

13. THICK ASBESTOS AIR-CELL INSULATION
Effectively prevents heat loss from boiler.

14. JACKET
ARMCO iron, grey vitreous enameled on both sides. Black jacket trimmings, vitreous enameled.

15. CLEANOUT OPENINGS
Provides easy access for cleaning flue surfaces of sections.

16. PATENTED PIN TYPE CAST IRON SECTION
The most effective type of cast iron heat-absorbing surface.

Rapidly and efficiently absorbs the heat from the rising columns of hot gases, and transfers this heat to the water within.

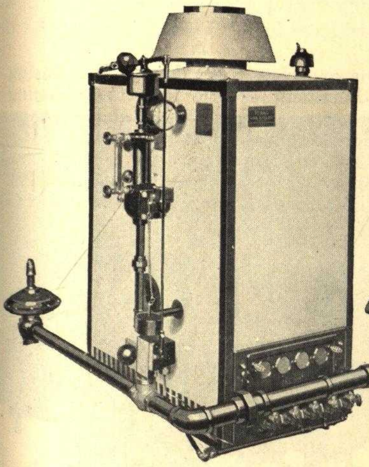
17. METAL-TO-METAL JOINT
Ground, gas-tight. No cement or putty used.

18. POP SAFETY VALVE
A.S.M.E. Standard.

19. DRAFT DIVERTER
ARMCO iron, vitreous enameled on both sides having vitreous enameled cone, welded in place.

Prevents either excessive drafts or down drafts from affecting proper combustion.

VIEWS OF TYPICAL CONTROLS



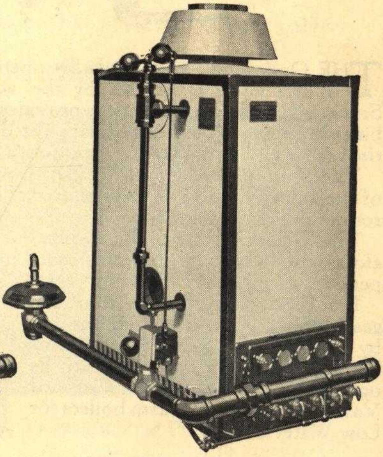
STEAM

Steam Regulator controls gas supply to maintain desired steam pressure.

Low-Water Cut-out shuts off the gas if the water level becomes too low.

Thermostatic Pilot shuts off the gas if pilot goes out.

Valve designed for use with room thermostatic control.



WATER

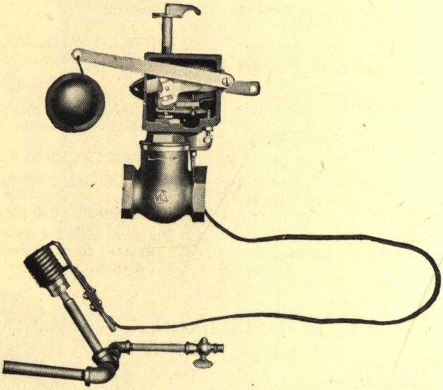
Water Regulator controls gas supply to maintain desired water temperature.

Thermostatic Pilot shuts off the gas if pilot goes out.

Valve designed for use with room thermostatic control.

NO. 596 THROTTLING VALVE

EQUIPPED WITH OPERATING LEVER—SHUT-OFF LEVER AND THERMOSTATIC PILOT CONTROL

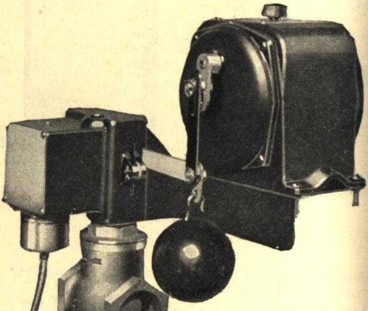


THE Operating Lever *gradually* opens or closes the valve. (The closing of the valve is limited by the adjustment of the By-Pass Adjusting Screw.) This throttling action provides extremely sensitively balanced combustion in exact accordance with the demand, and minimizes fluctuation in the gas supply. It is absolutely noiseless and uniform in operation.

The Shut-off Lever and Weight completely closes the Valve independent of the action of the Operating Lever. The Shut-off Lever is for connection to room temperature control.

The Thermostatic Pilot Control closes the Valve completely, independent of all other controls.

Provisions are made to shut off the gas supply completely when desired, by means of Weighted Valve Pin or Spring Valve Pin, which can be operated by hand. The Weighted Valve Pin is used on steam boilers for Low Water Cut-off.

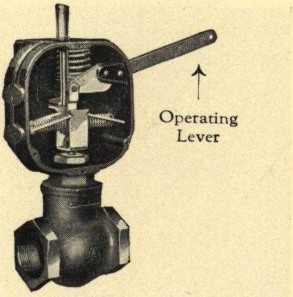


NO. 596 ELECTRIC MOTOR CONTROL

A special motor mounted on a No. 596 Valve. The motor is directly connected to the Shut-off Lever of the Valve, eliminating chains and pulleys.

NO. 600 SNAP ACTION VALVE

EQUIPPED WITH OPERATING LEVER AND THERMOSTATIC PILOT CONTROL



THE Operating Lever instantly opens or closes the valve. When the lever is moved upward the valve snaps completely open. When it is moved downward the valve snaps completely shut. It cannot stop on dead center.

The Thermostatic Pilot control operates independently of the Operating Lever.

Provisions are made to shut off the gas supply completely when desired, by means of a Weighted Valve Pin or Spring Valve Pin, which can be operated by hand. The Weighted Valve Pin is used on steam boilers for Low Water Cut-off.

No. 600 Electric Motor Control available for No. 600 Snap Action Valve.

THERMOSTATIC PILOT

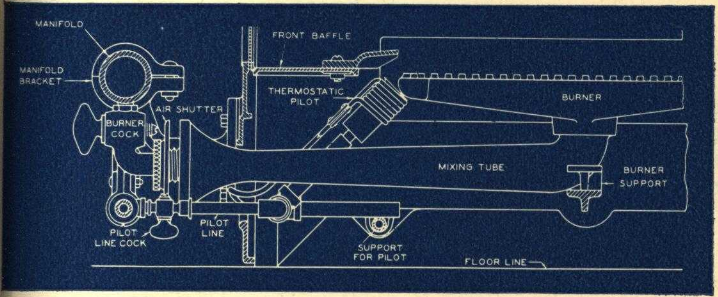


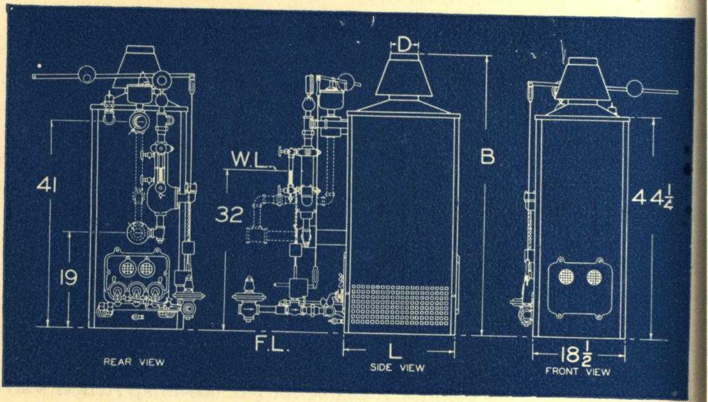
Diagram Showing Assembly of Thermostatic Pilot

The Thermostatic Pilot operates on the principle of vapor-tension. A very sensitive volatile liquid is used which, when the pilot is lit, creates a powerful pressure which easily holds the valve open. After being adjusted at time of installation no further adjustment is necessary. Years of service will not affect its power or sensitiveness. Its operating point remains constant. It does not change after a period of use as is frequently the case with thermostatic elements of two metals.

DATA AND MEASUREMENTS

IDEAL GAS BOILERS

TYPE O-G



STEAM BOILERS

Boiler No.	A.G.A. Rating Sq. Ft.	No. of Burners	Size of Gas Supply	No. and Size of Tappings		Dimensions—Inches		
				Flow	Return	D	B	L
O-GS-4	270	3	1	1–2½	1–2½	5	54	13¾
O-GS-5	340	3	1	1–2½	1–2½	5	54	16¾
O-GS-6	410	3	1	1–2½	1–2½	6	55	19¾
O-GS-7	480	3	1	1–2½	1–2½	6	55	22¾

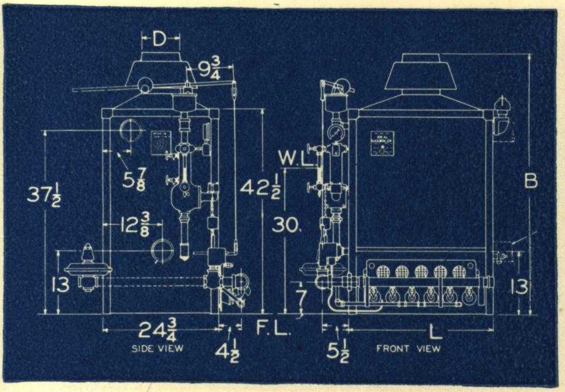
WATER BOILERS

Boiler No.	A.G.A. Rating Sq. Ft.	No. of Burners	Size of Gas Supply	No. and Size of Tappings		Dimensions—Inches		
				Flow	Return	D	B	L
O-GW-4	430	3	1	1–2½	1–2½	5	54	13¾
O-GW-5	540	3	1	1–2½	1–2½	5	54	16¾
O-GW-6	660	3	1	1–2½	1–2½	6	55	19¾
O-GW-7	770	3	1	1–2½	1–2½	6	55	22¾

DATA AND MEASUREMENTS

IDEAL GAS BOILERS

TYPE 1-G



STEAM BOILERS

Boiler No.	A.G.A. Rating Sq. Ft.	No. of Burners	Size of Gas Control Valve	No. and Size of Tappings		Dimensions—Inches		
				Flow	Return	D	B	L
1-GS-4	550	3	1–1¼	2–4	2–4	6	52½	18½
1-GS-5	710	4	1–1¼	2–4	2–4	7	52½	22½
1-GS-6	870	5	1–1½	2–4	2–4	8	53	26½
1-GS-7	1030	6	1–1½	2–4	2–4	8	53¾	30½
1-GS-8	1180	7	1–1½*	2–4	2–4	8	54½	34½
1-GS-9	1340	8	1–2	2–4	2–4	9	57½	38½
1-GS-10	1500	9	1–2	2–4	2–4	9	58¼	42½
1-GS-11	1660	10	1–2	2–4	2–4	10	58¾	46½

WATER BOILERS

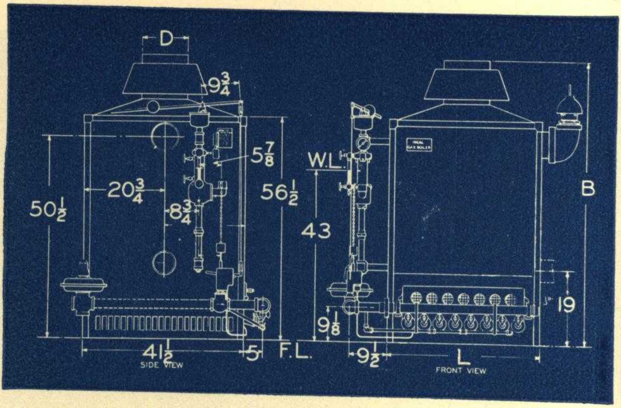
Boiler No.	A.G.A. Rating Sq. Ft.	No. of Burners	Size of Gas Control Valve	No. and Size of Tappings		Dimensions—Inches		
				Flow	Return	D	B	L
1-GW-4	880	3	1–1¼	2–4	2–4	6	52½	18½
1-GW-5	1130	4	1–1¼	2–4	2–4	7	52½	22½
1-GW-6	1390	5	1–1½	2–4	2–4	8	53	26½
1-GW-7	1640	6	1–1½	2–4	2–4	8	53¾	30½
1-GW-8	1890	7	1–1½*	2–4	2–4	8	54½	34½
1-GW-9	2150	8	1–2	2–4	2–4	9	57½	38½
1-GW-10	2400	9	1–2	2–4	2–4	9	58¼	42½
1-GW-11	2650	10	1–2	2–4	2–4	10	58¾	46½

*Uses 2-inch governor.

DATA AND MEASUREMENTS

IDEAL GAS BOILERS

TYPE 4-G (6-11 Sections)



STEAM BOILERS

Boiler No.	A.G.A. Rating Sq. Ft.	No. of Burners	Size of Gas Control Valve	No. and Size of Tappings		Dimensions—Inches		
				Flow	Return	D	B	L
4-GS-6	2000	5	1–2	1–6	1–5	11	69	27
4-GS-7	2400	6	1–2*	1–6	1–5	12	69¾	31
4-GS-8	2800	7	1–2*	1–6	1–5	13	71¾	35
4-GS-9	3200	8	1–2½	1–6	1–5	14	72½	39
4-GS-10	3600	9	1–2½	1–6	1–5	15	75	43
4-GS-11	4000	10	1–2½	1–6	1–5	16	75¾	47

WATER BOILERS

Boiler No.	A.G.A. Rating Sq. Ft.	No. of Burners	Size of Gas Control Valve	No. and Size of Tappings**		Dimensions—Inches		
				Flow	Return	D	B	L
4-GW-6	3200	5	1–2	1–6	1–5	11	69	27
4-GW-7	3840	6	1–2*	1–6	1–5	12	69¾	31
4-GW-8	4480	7	1–2*	1–6	1–5	13	71¾	35
4-GW-9	5120	8	1–2½	1–6	1–5	14	72½	39
4-GW-10	5760	9	1–2½	1–6	1–5	15	75	43
4-GW-11	6400	10	1–2½	1–6	1–5	16	75¾	47

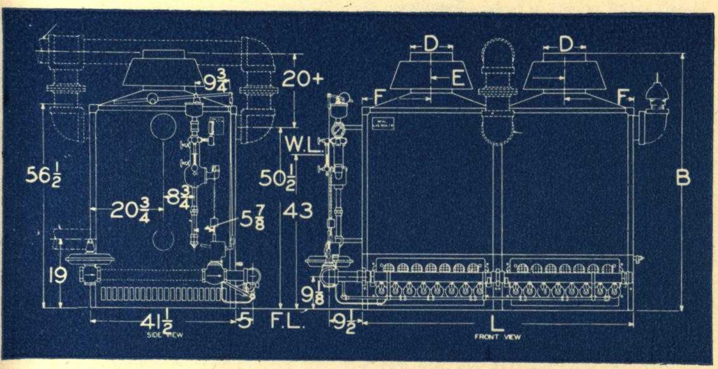
*Uses 2½-inch governor.

**When specified, additional tappings available 1—6-inch flow and 1—5-inch return.

DATA AND MEASUREMENTS

IDEAL GAS BOILERS

TYPE 4-G (13-28 Sections)



STEAM BOILERS

Boiler No.	A.G.A. Rating Sq. Ft.	No. of Burners	Size of Gas Control Valve	No. and Size of Tappings*		No. and Size of Flue Connections	Dimensions—Inches			
				Flow	Return		B	E	F	L
4-GS-13	4800	12	1–3	2–6	1–5	2–12	69¾	30¼	15½	61
4-GS-15	5600	14	1–3	2–6	1–5	2–13	71¾	34¼	17½	69
4-GS-17	6400	16	2–2½	2–6	1–5	2–14	72½	38¼	19½	77
4-GS-19	7200	18	2–2½	2–6	1–5	2–15	75	42¼	21½	85
4-GS-21	8000	20	2–2½	2–6	1–5	2–16	75¾	46¼	23½	93
4-GS-22	8400	21	2–3	4–6	2–5	3–13	71¾	34¼	17½	103
4-GS-25	9600	24	2–3	4–6	2–5	3–14	72½	38¼	19½	115
4-GS-28	10800	27	2–3	4–6	2–5	3–15	75	42¼	21½	127

WATER BOILERS

4-GW-13	7680	12	1–3	2–6	1–5	2–12	69¾	30¼	15½	61
4-GW-15	8960	14	1–3	2–6	1–5	2–13	71¾	34¼	17½	69
4-GW-17	10240	16	2–2½	2–6	1–5	2–14	72½	38¼	19½	77
4-GW-19	11520	18	2–2½	2–6	1–5	2–15	75	42¼	21½	85
4-GW-21	12800	20	2–2½	2–6	1–5	2–16	75¾	46¼	23½	93
4-GW-22	13440	21	2–3	4–6	2–5	3–13	71¾	34¼	17½	103
4-GW-25	15360	24	2–3	4–6	2–5	3–14	72½	38¼	19½	115
4-GW-28	17280	27	2–3	4–6	2–5	3–15	75	42¼	21½	127

* When specified, additional tappings available on all boilers 2—6-inch flow and 2—5-inch return.

TABLE FOR SELECTING CORRECT SIZE

	STEAM			WATER	
Boiler No.	A.G.A. Rating	Supplies Sq. Ft. Direct C. I. Radiation	Boiler No.	A.G.A. Rating	Supplies Sq. Ft. Direct C. I. Radiation
0-GS-4	270	173	0-GW-4	430	280
0-GS-5	340	219	0-GW-5	540	350
0-GS-6	410	263	0-GW-6	660	420
0-GS-7	480	307	0-GW-7	770	490
1-GS-4	550	353	1-GW-4	880	564
1-GS-5	710	456	1-GW-5	1130	732
1-GS-6	870	558	1-GW-6	1390	909
1-GS-7	1030	661	1-GW-7	1640	1076
1-GS-8	1180	767	1-GW-8	1890	1254
1-GS-9	1340	872	1-GW-9	2150	1440
1-GS-10	1500	981	1-GW-10	2400	1624
1-GS-11	1660	1090	1-GW-11	2650	1810
4-GS-6	2000	1332	4-GW-6	3200	2214
4-GS-7	2400	1624	4-GW-7	3840	2676
4-GS-8	2800	1922	4-GW-8	4480	3151
4-GS-9	3200	2215	4-GW-9	5120	3634
4-GS-10	3600	2506	4-GW-10	5760	4114
4-GS-11	4000	2800	4-GW-11	6400	4571
4-GS-13	4800	3400	4-GW-13	7680	5500
4-GS-15	5600	4000	4-GW-15	8960	6400
4-GS-17	6400	4600	4-GW-17	10240	7300
4-GS-19	7200	5100	4-GW-19	11520	8240
4-GS-21	8000	5700	4-GW-21	12800	9100
4-GS-22	8400	6000	4-GW-22	13440	9600
4-GS-25	9600	6900	4-GW-25	15360	11000
4-GS-28	10800	7700	4-GW-28	17280	12300

The above is in accordance with recommendations of the American Gas Association.

The figures shown are applicable to normal installations only. Twenty-five per cent allowance for pick-up or starting load was made in each instance in addition to an average allowance for heat loss of piping.

When dealing with an abnormal condition, first determine the equivalent condensing load of the radiators and all piping. To this sum add the starting allowance of twenty-five per cent. Select Ideal Gas Boiler having an equivalent capacity.

GAS CONSUMPTION AT BOILER RATING ACCORDING TO HEAT VALUE OF GAS

Boiler Number		No. of Burners	Cu. Ft. of Gas per Hour Required to Obtain Rated Output for Various Gross Heat Values of Gas in B.t.u. per Cu. Ft.												
			300	350	400	450	500	525	550	600	700	800	900	1000	1100
0-GS- 4	0-GW- 4	3	267	228	200	178	160	152	145	133	114	100	89	80	73
0-GS- 5	0-GW- 5	3	338	290	253	225	202	192	184	169	145	127	113	101	92
0-GS- 6	0-GW- 6	3	410	350	307	272	245	233	223	205	175	153	136	123	111
0-GS- 7	0-GW- 7	3	480	412	360	320	288	274	262	240	206	180	160	144	131
1-GS- 4	1-GW- 4	3	550	472	412	366	330	314	300	275	236	206	183	165	150
1-GS- 5	1-GW- 5	4	708	607	531	472	425	405	386	354	303	266	236	213	193
1-GS- 6	1-GW- 6	5	866	742	650	577	520	495	472	433	371	325	289	260	236
1-GS- 7	1-GW- 7	6	1025	878	770	682	615	586	559	512	439	384	341	308	279
1-GS- 8	1-GW- 8	7	1182	1014	887	788	710	677	645	592	507	444	394	355	322
1-GS- 9	1-GW- 9	8	3142	1150	1006	895	805	766	732	671	575	503	447	403	366
1-GS-10	1-GW-10	9	1500	1284	1124	1000	900	858	818	750	642	562	500	450	409
1-GS-11	1-GW-11	10	1658	1420	1244	1111	995	948	905	829	711	622	552	498	452
4-GS- 6	4-GW- 6	5	1952	1672	1464	1302	1172	1113	1064	976	836	732	651	586	532
4-GS- 7	4-GW- 7	6	2340	2006	1756	1560	1404	1337	1276	1170	1003	878	780	702	638
4-GS- 8	4-GW- 8	7	2730	2340	2050	1820	1638	1558	1490	1365	1170	1025	910	819	745
4-GS- 9	4-GW- 9	8	3122	2676	2342	2082	1874	1782	1704	1561	1338	1171	1041	937	852
4-GS-10	4-GW-10	9	3516	3004	2636	2344	2106	2005	1916	1758	1502	1318	1172	1053	958
4-GS-11	4-GW-11	10	3906	3342	2928	2604	2342	2225	2128	1953	1671	1464	1302	1171	1064
4-GS-13	4-GW-13	12	4680	4020	3516	3120	2810	2675	2560	2340	2010	1758	1560	1405	1280
4-GS-15	4-GW-15	14	5470	4680	4100	3646	3280	3120	2984	2735	2340	2050	1823	1640	1492
4-GS-17	4-GW-17	16	6250	5350	4680	4166	3744	3562	3410	3125	2675	2340	2083	1872	1705
4-GS-19	4-GW-19	18	7020	6020	5270	4680	4212	4010	3830	3510	3010	2635	2340	2106	1915
4-GS-21	4-GW-21	20	7800	6680	5860	5200	4680	4460	4260	3900	3340	2930	2600	2340	2130
4-GS-22	4-GW-22	21	8200	7020	6250	5466	4910	4680	4476	4100	3510	3075	2733	2455	2238
4-GS-25	4-GW-25	24	9370	8030	7030	6246	5630	5350	5116	4680	4015	3515	3123	2815	2558
4-GS-28	4-GW-28	27	10530	9020	7900	7020	6320	6010	5750	5265	4510	3950	3510	3160	2875

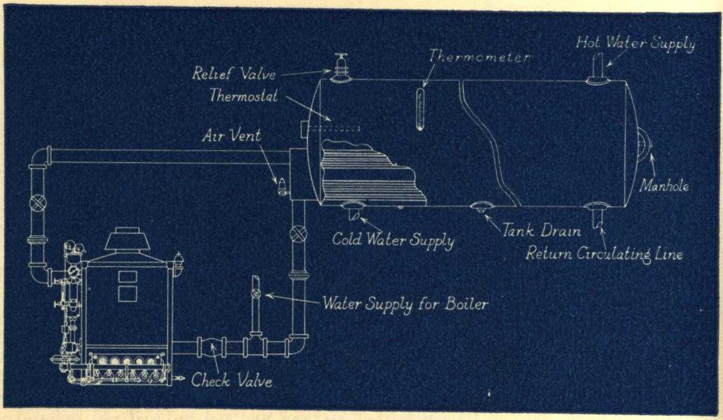
NOTE:—Excessive gas consumption will cause incomplete combustion and loss in efficiency.

The purpose of the gas pressure governor is to maintain the gas pressure at the boiler at a fixed maximum.

In cases where available gas pressure is not sufficient, the burner spuds can be drilled somewhat larger and the gas pressure governor correspondingly adjusted to maintain the lower pressure and to avoid exceeding the rated gas consumption of the boiler.

HOW TO USE IDEAL GAS BOILERS

For Water Heating



INDIRECT METHOD

Using the combined hot water service and storage heaters or tanks with steam coils

A GAS boiler has a constant B.t.u. input and a positive firing efficiency, thus enabling close figuring and a resulting high economy. This, coupled with the general reliability and automatic control of the equipment, makes gas boiler domestic hot water supply systems a subject of interest to the average utility consumer, and is also a very profitable field for both the heating contractor and gas utility.

RATINGS

The Ideal gas boiler ratings shown in the following table are steam boiler ratings, based on the available B.t.u. delivered at the boiler outlet per hour. These ratings are in accord with the specifications of the A.G.A. code for testing and rating gas fired boilers. This table is, therefore, very conservative when used in estimating on water boilers for direct hot water supply systems, as the efficiencies of water boilers are slightly higher than steam boilers, though not enough to make the direct method preferable over the indirect method of heating water.

IDEAL GAS BOILER RATINGS
for
HOT WATER SUPPLY

Boiler No.	Gallons of Water per Hour Raised Degrees F.					
	40°	60°	80°	100°	120°	140°
0-G-4	192	128	96	77	64	55
0-G-5	243	162	122	97	81	70
0-G-6	295	197	147	118	98	84
0-G-7	346	231	173	138	115	99
1-G-4	396	264	198	159	132	113
1-G-5	510	340	255	204	170	146
1-G-6	624	415	312	250	208	178
1-G-7	738	492	369	295	246	211
1-G-8	852	568	426	341	284	244
1-G-9	966	644	483	387	322	276
1-G-10	1080	720	540	432	360	309
1-G-11	1195	796	597	478	398	341
4-G-6	1440	960	720	575	480	410
4-G-7	1725	1150	860	690	575	490
4-G-8	2010	1340	1010	805	670	575
4-G-9	2300	1535	1150	920	765	655
4-G-10	2590	1725	1290	1035	860	740
4-G-11	2875	1915	1440	1150	955	820
4-G-13	3450	2300	1720	1380	1150	980
4-G-15	4020	2680	2010	1610	1340	1150
4-G-17	4600	3070	2300	1840	1530	1310
4-G-19	5170	3450	2590	2070	1720	1480
4-G-21	5750	3830	2880	2300	1910	1640
4-G-22	6030	4020	3030	2415	2010	1725
4-G-25	6900	4605	3450	2760	2295	1965
4-G-28	7770	5175	3870	3105	2580	2220

IDEAL HOTCOIL WATER HEATER
FOR GAS

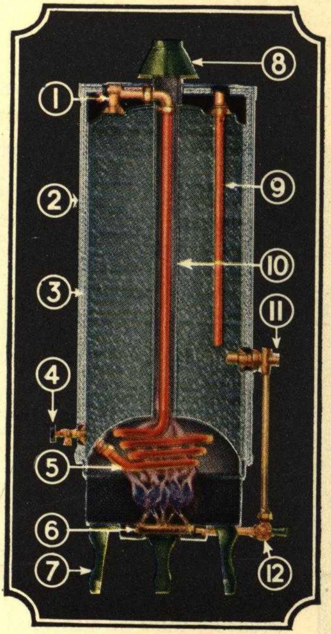
Patents Pending

Made in 20, 30 and 40 gallon sizes

THE Hotcoil unites the quick action of flash heating with the economy of the automatic storage heater. It has a Bunsen type burner with self pilot. The heat-absorbing element is a large bore, heavy gauge, one piece copper coil. The tank is of heavy sheet steel, galvanized inside and out, and tested to 300 pound pressure. Completely insulated with asbestocel. The steel jacket has baked grey enamel finish. Permanently reliable automatic operation is assured by the Arco Regulator with its quick-acting metal bellows. Top and base are finished in green porcelain enamel.

IDEAL HOT COIL WATER HEATER

FOR GAS



SPECIFICATIONS

1. Brass flow-fitting.
2. One-inch asbestocel insulation protected by indestructible metal jacket with pearl-grey baked-enamel finish.
3. Substantial heavy-gauge tank, galvanized inside and outside.
4. Conveniently located brass drain cock.
5. Large-bore, heavy-gauge, one-piece copper coil heating element.
6. Bunsen-type gas burner with self pilot.
7. Substantial base and legs finished in porcelain enamel.
8. Back draft diverter and top finished in porcelain enamel.
9. Non-syphon-acting intake.
10. Central water-surrounded flue containing copper coil heating element.
11. Arco automatic regulator with quick acting metal bellows.
12. Main gas supply control valve.

IDEAL EVERDUR WATER HEATER
FOR GAS

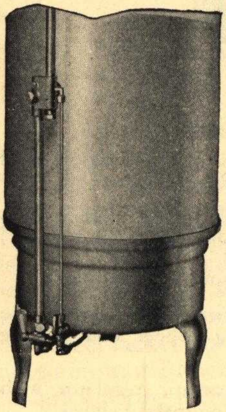
Made in 20, 30 and 40 gallon sizes

THE Everdur has been developed for use in communities where the water contains chemicals that attack ordinary metals. Its tank is of Everdur Metal, a non-corrosive, everlasting copper alloy. Everdur Metal is superior to pure copper for this use, as it may be welded solidly and has almost the tensile strength of steel. The tank is tested to 300 pounds pressure. Burner, heating element, regulator, asbestocel insulation, jacket, and finish are the same as those of the Hotcoil. Regularly equipped with Ideal Automatic Pilot Control Valve.

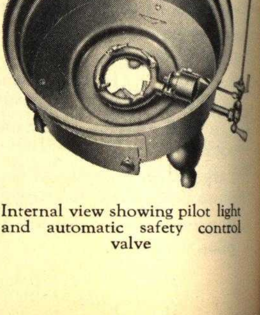
IDEAL AUTOMATIC PILOT CONTROL VALVE

WHERE gas pressure is uncertain, a gas-burning water heater should be equipped with a device for automatically cutting off the gas supply to the burner if the pilot goes out. If low gas pressure or other accident extinguishes the pilot of the Everdur Heater, the Ideal Automatic Pilot Control Valve immediately stops the flow of gas until the pilot is relighted.

Everdur Heaters are regularly equipped with the Ideal Automatic Pilot Control Valve at no additional charge. Hotcoil Heaters may be supplied with it on special order at slight additional cost.



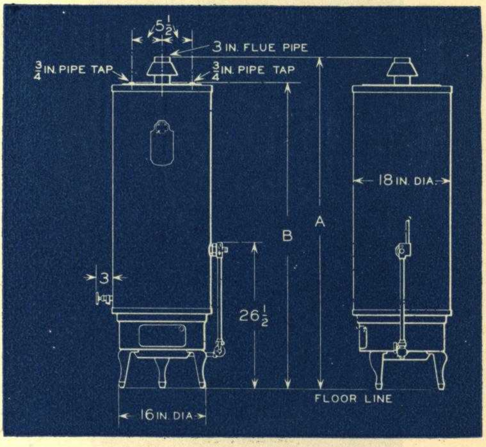
Showing the external connection to the main gas line



Internal view showing pilot light and automatic safety control valve

IDEAL HOTCOIL WATER HEATERS AND EVERDUR

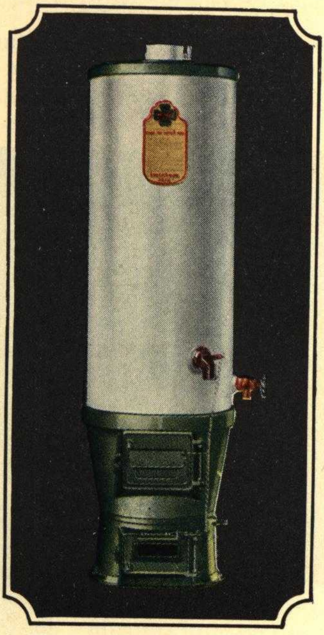
Measurements and Data



SPECIFICATIONS

Number	Nominal Capacity Gallons	Gas Connection Ins.	Cold Water Inlet Ins.	Hot Water Outlet Ins.	Flue Connection Ins.	Gas Consumption of Burner Cubic Feet Per Hour			Dimensions Inches	
						Manufactured Gas 550B.t.u.	Mixed Gas 750 B.t.u.	Natural Gas 1100 B.t.u.	"A"	"B"
G-20	20	⅜	¾	¾	3	36.4	26.7	18.2	49	43½
G-30	30	⅜	¾	¾	3	45.5	33.3	22.7	60	54½
G 40	40	⅜	¾	¾	3	54.5	40.0	27.3	71½	66

IDEAL KOLFLASH WATER HEATERS
FOR COAL

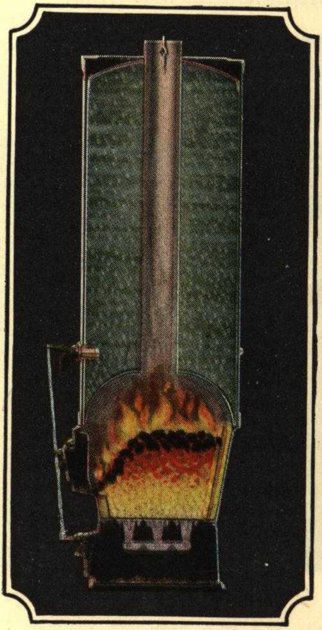


Patents Pending

THE Kolflash Water Heater is a completely automatic coal-burning water heater of the self-contained storage type. In areas beyond gas mains, the Kolflash has proved tremendously popular. It also fills a very important need in commercial installations such as beauty parlors, barber shops, apartment houses, etc., where low operating cost is essential.

The Kolflash provides constant and abundant hot water for only a few cents a day. Its convenience, economy and attractive appearance have won instant and widespread public approval.

IDEAL KOLFLASH WATER HEATER
FOR COAL



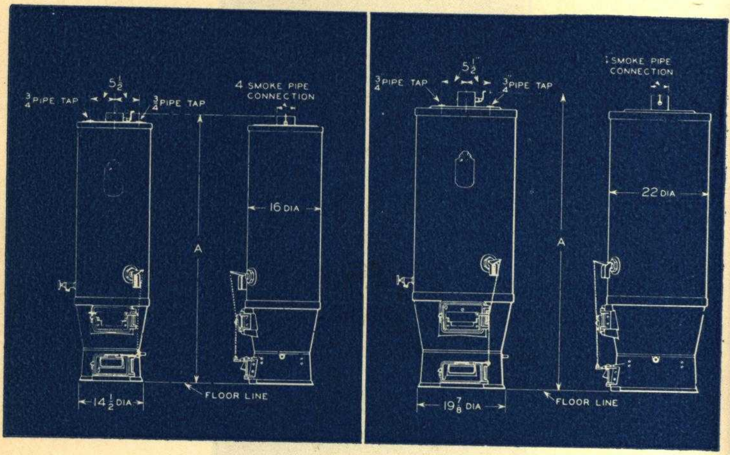
SPECIFICATIONS

1. One-inch, non-heat-conducting refractory lining in firepot. Prevents radiation heat loss and provides for quick pick-up heating capacity.
2. Water-surrounded flue. Insures continuous extraction of heat from the hot gases of combustion.
3. Automatic regulation, precise and reliable.
4. Indestructible metal insulating jacket with beautiful pearl-grey baked-enamel finish.
5. Firepot, base, and top finished in beautiful porcelain-enamel.

Made in 30, 40, 60, and 80 gallon sizes
Burn hard or soft coal

IDEAL KOLFLASH WATER HEATER

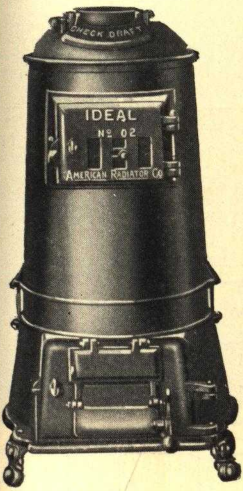
Measurements and Data



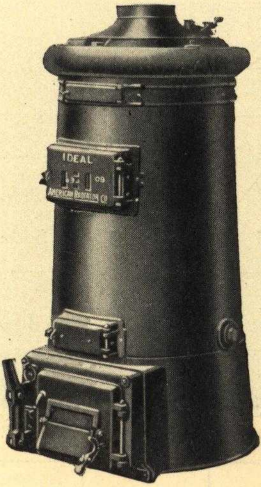
SPECIFICATIONS

Number	Nominal Capacity Gallons	Fuel Capacity Lbs.	Cold Water Inlet Ins.	Hot Water Outlet Ins.	Smoke Pipe Connection Ins.	Dimension "A" Ins.
30	30	41	¾	¾	4	60
40	40	41	¾	¾	4	72¾
60	60	108	¾	¾	4	64¼
80	80	108	¾	¾	4	77

IDEAL HOT WATER SUPPLY BOILERS



Nos. 01-03



Nos. 04-09

IDEAL Hot Water Supply Boilers are for use where large quantities of hot water must be constantly available.

Made of cast iron, they are virtually immune to rust and corrosion.

Ideal Hot Water Supply Boilers are designed to burn all kinds of fuel, particularly hard or soft coal, coke, gas, or wood. Parts are joined by finely lathe-turned screw nipples, made of the same iron mixture that is used in the boiler itself, thus insuring uniform expansion and contraction throughout, and permanently water-tight joints.

IDEAL HOT WATER SUPPLY BOILERS

Ideal Nos. 01-03

Number	*Nominal Capacities, Gallons	Style of Grate	Nominal Diameter Grate, Inches	Grate Area, Square Feet	Outlets and Inlets, Number and Size, Inches
01	56	Slide	10	.59	1-1½
02	93	Slide	10	.54	1-1½
03	144	Slide	10	.59	1-1½

Ideal Nos. 04-09

Number	*Nominal Capacities, Gallons	Style of Grate	Nominal Diameter Grate, Inches	Grate Area, Square Feet	Outlets and Inlets, Number and Size, Inches
04	192	Rocking	12	.80	3-1½
†05	210	Rocking	12	.80	3-1½
06	384	Rocking	15	1.23	3-2
†07	426	Rocking	15	1.23	3-2
08	600	Rocking	18	1.92	3-2
†09	660	Rocking	18	1.92	3-2

* Gallons per hour per 25 degree rise on 8-hour firing period, with hard coal.

† Equipped with Dome sections, all others have fire pot section only, or no intermediate sections used.

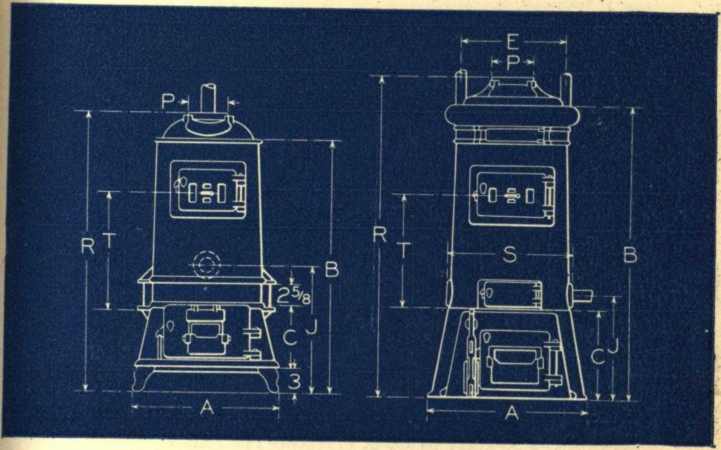
All the above boilers have butterfly type damper and ashpit door for automatic regulation.

When Hot Water Supply Boilers are subjected to some unusual pressure, as is the case when tanks are connected direct to city pumping station, and the pressure is increased during times of conflagration or the like, it is recommended that the system be equipped with a Water-Pressure Reducing Valve and Relief Valve.

No firing tools are supplied with above Boilers.

In cases of unusually high city water pressure or where the demand for hot water supply is very large, we recommend the use of Ideal Steam Boilers in connection with storage tank.

IDEAL HOT WATER SUPPLY BOILERS



Nos. 01-03 Nos. 04-09

DIMENSIONS (INCHES)

Number of Boiler	Nominal Diameter of Grate	A	B	C	E	I	R	S	T
		Diameter of Base	Height to Top of Supply Tap	Height of Base	Distance between Center Supply Tapping	Height to Center of Return Tap	Height to Top of Smoke-Hood	Dimension of Firepot at Return Tapping	Top of Grate to Center of Fire Door
01	10	$15\frac{1}{4}$	$24\frac{5}{32}$	$7\frac{21}{32}$	......	$14\frac{25}{32}$	$27\frac{5}{8}$	......	$8\frac{3}{4}$
02		18	31	$7\frac{5}{8}$	......	$14\frac{1}{2}$	$34\frac{1}{2}$	......	14
03		18	$32\frac{5}{8}$	$7\frac{5}{8}$	......	$12\frac{1}{4}$	$36\frac{1}{8}$	......	$17\frac{1}{8}$
04	12	$23\frac{1}{8}$	$36\frac{3}{8}$	$12\frac{7}{8}$	12	$14\frac{3}{4}$	$40\frac{3}{8}$	$18\frac{3}{4}$	$16\frac{1}{4}$
05		$23\frac{1}{8}$	$42\frac{1}{8}$	$12\frac{7}{8}$	$14\frac{3}{4}$	$14\frac{3}{4}$	$45\frac{7}{8}$	$18\frac{3}{4}$	$16\frac{1}{4}$
06	15	$24\frac{3}{4}$	$42\frac{3}{8}$	$12\frac{7}{8}$	$14\frac{7}{8}$	$14\frac{7}{8}$	48	$20\frac{9}{16}$	$21\frac{7}{8}$
07		$24\frac{3}{4}$	$48\frac{1}{8}$	$12\frac{7}{8}$	$17\frac{1}{4}$	$14\frac{7}{8}$	$53\frac{1}{2}$	$20\frac{9}{16}$	$21\frac{7}{8}$
08	18	$27\frac{1}{8}$	$42\frac{1}{2}$	$12\frac{7}{8}$	$18\frac{1}{4}$	15	$47\frac{3}{4}$	$23\frac{7}{8}$	$21\frac{3}{8}$
09		$27\frac{1}{8}$	$48\frac{3}{4}$	$12\frac{7}{8}$	$17\frac{3}{4}$	15	$54\frac{1}{8}$	$23\frac{7}{8}$	$21\frac{3}{8}$

Diameter of Pipe Collar "P," for Nos. 01, 02, 03 is 5 inches; for 04, 05, 06 is 6 inches, and for 08, 09 is 7 inches.

Boilers Nos. 01 to 03 inclusive will be regularly furnished with base bottom and legs, which on special order can be furnished for Nos. 04 to 09 boilers. When this bottom and legs are used under Nos. 04 to 09, add $3\frac{3}{4}$ inches to B, I and R measurements.

HOT WATER SUPPLY BOILERS

No. 01 Ideal

Hours	5	6	7	8	9	10	11	12
B.t.u. Per Hour	18144	15120	12960	11340	10080	9072	8247	7560

Capacity in U. S. Gallons Per Hour

Temp. Rise	25	90	74	64	56	50	45	41	37
Degr. Fahr.	50	45	37	32	28	25	23	20	19
Per Hour	100	21	17	15	13	11	10	8	7

Capacity in U. S. Gallons Per Hour

Temp. Rise	25	130	108	93	81	72	65	59	54
Degr. Fahr.	50	165	53	46	40	36	32	29	27
Per Hour	100	32	27	23	20	18	16	14	13

No. 02 Ideal

Hours	5	6	7	8	9	10	11	12
B.t.u. Per Hour	30808	25666	22000	19250	17111	15400	14000	12833

Capacity in U. S. Gallons Per Hour

Temp. Rise	25	148	124	106	93	82	74	67	62
Degr. Fahr.	50	74	62	53	46	41	37	34	31
Per Hour	100	36	30	26	23	20	18	17	15

No. 03 Ideal

Hours	5	6	7	8	9	10	11	12
B.t.u. Per Hour	48000	40000	34285	30000	26666	24000	21818	20000

Capacity in U. S. Gallons Per Hour

Temp. Rise	25	231	192	165	144	128	116	105	96
Degr. Fahr.	50	116	96	82	72	64	58	52	48
Per Hour	100	58	48	41	36	32	29	26	24

No. 04 Ideal

Hours	5	6	7	8	9	10	11	12
B.t.u. Per Hour	64000	53333	45714	40000	35555	32000	29090	26666

Capacity in U. S. Gallons Per Hour

Temp. Rise	25	307	257	219	192	171	154	139	128
Degr. Fahr.	50	154	128	110	96	85	77	70	64
Per Hour	100	77	64	55	48	43	39	35	32

* *Note.*—To obtain output in square feet water radiation per hour divide B.t.u. per hour by 150.

HOT WATER SUPPLY BOILERS

No. 05 Ideal

Hours	5	6	7	8	9	10	11	12
B.t.u. Per Hour	70400	58666	50285	44000	39111	35200	32000	29333

Capacity in U. S. Gallons Per Hour

Temp. Rise	25	336	280	240	210	187	168	154	140
Degr. Fahr.	50	168	140	120	105	93	84	77	70
Per Hour	100	84	70	60	53	47	42	39	35

No. 06 Ideal

Hours	5	6	7	8	9	10	11	12
B.t.u. Per Hour	128000	106666	91428	80000	71111	64000	58181	53333

Capacity in U. S. Gallons Per Hour

Temp. Rise	25	614	512	439	384	341	307	280	256
Degr. Fahr.	50	307	256	220	192	170	154	140	128
Per Hour	100	153	128	110	96	85	77	70	64

No. 07 Ideal

Hours	5	6	7	8	9	10	11	12
B.t.u. Per Hour	140800	117000	100571	88000	78222	70400	64000	58666

Capacity in U. S. Gallons Per Hour

Temp. Rise	25	672	560	480	426	373	336	305	280
Degr. Fahr.	50	336	280	240	213	187	168	153	140
Per Hour	100	168	140	120	106	93	84	76	70

No. 08 Ideal

Hours	5	6	7	8	9	10	11	12
B.t.u. Per Hour	200000	166666	142857	125000	111111	100000	90909	83333

Capacity in U. S. Gallons Per Hour

Temp. Rise	25	960	800	685	600	533	480	440	400
Degr. Fahr.	50	480	400	342	300	267	240	220	200
Per Hour	100	240	200	171	150	133	120	110	100

No. 09 Ideal

Hours	5	6	7	8	9	10	11	12
B.t.u. Per Hour	220000	183333	157142	137500	122222	110000	100000	91666

Capacity in U. S. Gallons Per Hour

Temp. Rise	25	1056	880	754	660	587	528	480	440
Degr. Fahr.	50	528	440	377	330	294	264	240	220
Per Hour	100	264	220	189	165	147	132	120	110

* *Note.*—To obtain output in square feet water radiation per hour devide B.t.u. per hour by 150.

THE IDEAL VECTO HEATER

Patented

Burns Coal, Coke or Wood

THE Vecto is a warm air cabinet type of heater—not the equal of radiator heating—but vastly superior to the old-fashioned single room heater.

Burning the same amount of coal as the older single room heater, the Vecto distributes its warmth through a series of rooms. It heats by convection. Air is drawn in at the base and, as it becomes heated it rises, in accordance with the law of gravity, and flows upward and outward through other rooms.

The external jacket is finished in a beautiful walnut grained enamel. In its class, the Vecto is outstandingly the most efficient and the most attractive heater on the market.

The Vecto represents a real opportunity for making additional profit and more radiator heating sales. It makes the owner heating conscious, offering better warmth, more warmth, and greater economy than the old single room heater, preparing the way for the perfect warmth of radiator heat.

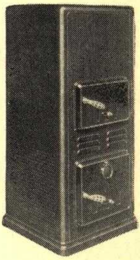
Burns hard or soft coal, coke or wood.

SIZES

3-C heats up to 3000 cu. ft.
5-C heats up to 5000 cu. ft.
8-C heats up to 8000 cu. ft.

DIMENSIONS

Size	Height Inches	Width Inches	Depth Inches
Vecto 3-C	33	15	14
Vecto 5-C	43	18	17
Vecto 8-C	48	21	21


Vecto 8-C

Vecto 5-C

Vecto 3-C

AMERICAN RADIATORS

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Perfection Pin B47–B48

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Arco Adjustable Wall Brackets B35–B39

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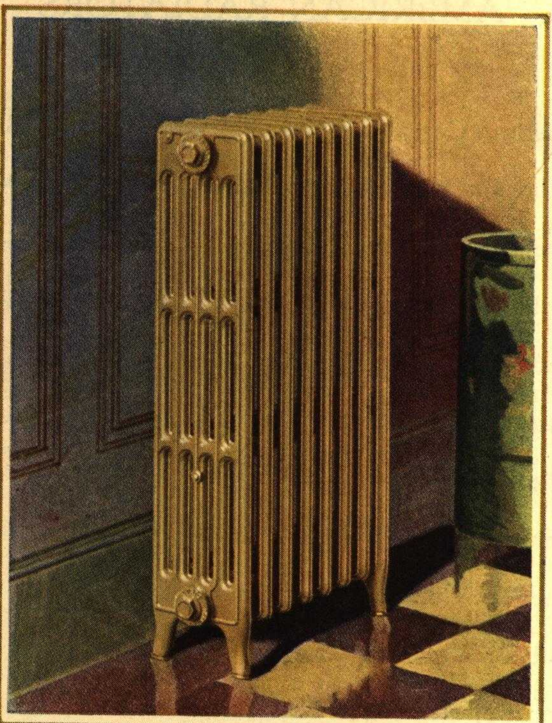
AMERICAN CORTO RADIATORS

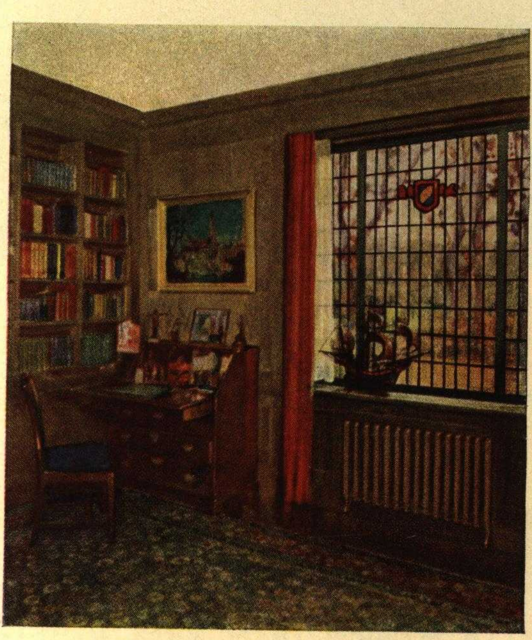


Patented

THE RADIATOR CLASSIC

NAMED after its famous artist-engineer designer, M. Courtot, the American Corto Radiator is today the most popular radiator in America and in fact throughout the world.

AMERICAN CORTO RADIATORS



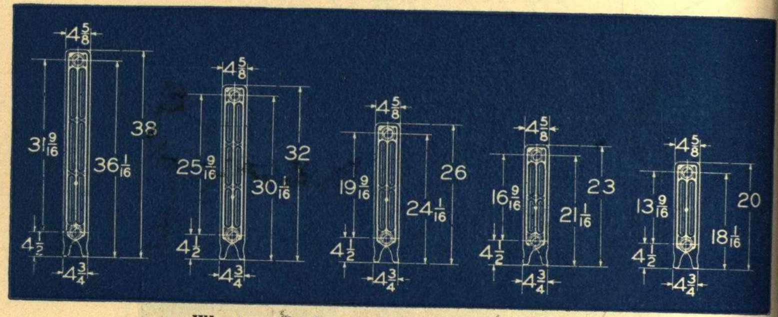
A Modern Radiator in Keeping with the Best of Decorative Taste

Its threaded nipple construction unites the advantages of both the faced and the threaded joint, being the tightest and safest construction known. And before leaving the factory, every radiator is tested under severe hydraulic pressure.

American Corto Radiators are made in a complete range of sizes for every need.

AMERICAN CORTO RADIATORS

Three-Tube



Width, 4⅝ Inches; Centers, 2½ Inches

Number of Sections	* Length 2½ Inches Per Section	Heating Surface—Square Feet Based upon Engineering Standard of 240 B.t.u. emission per Square Foot per Hour				
		20-inch Height 1¾ Sq. Ft. Per Section	23-inch Height 2 Sq. Ft. Per Section	26-inch Height 2⅓ Sq. Ft. Per Section	32-inch Height 3 Sq. Ft. Per Section	38-inch Height 3½ Sq. Ft. Per Section
2	5	3½	4	4⅔	6	7
3	7½	5¼	6	7	9	10½
4	10	7	8	9⅓	12	14
5	12½	8¾	10	11⅔	15	17½
6	15	10½	12	14	18	21
7	17½	12¼	14	16⅓	21	24½
8	20	14	16	18⅔	24	28
9	22½	15¾	18	21	27	31½
10	25	17½	20	23⅓	30	35
11	27½	19¼	22	25⅔	33	38½
12	30	21	24	28	36	42
13	32½	22¾	26	30⅓	39	45½
14	35	24½	28	32⅔	42	49
15	37½	26¼	30	35	45	52½
16	40	28	32	37⅓	48	56
17	42½	29¾	34	39⅔	51	59½
18	45	31½	36	42	54	63
19	47½	33¼	38	44⅓	57	66½
20	50	35	40	46⅔	60	70
21	52½	36¾	42	49	63	73½
22	55	38½	44	51⅓	66	77
23	57½	40¼	46	53⅔	69	80½
24	60	42	48	56	72	84
25	62½	43¾	50	58⅓	75	87½
26	65	45½	52	60⅔	78	91
27	67½	47¼	54	63	81	94½
28	70	49	56	65⅓	84	98
29	72½	50¾	58	67⅔	87	101½
30	75	52½	60	70	90	105

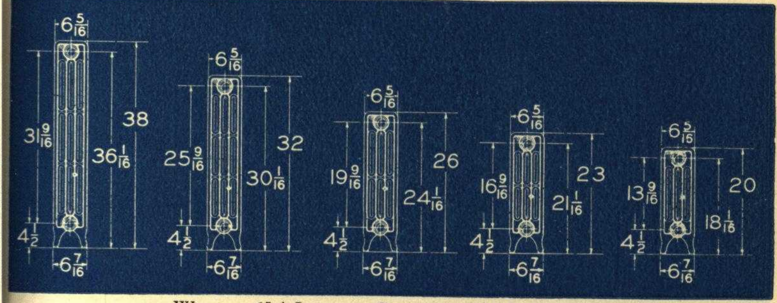
Tappings—1½ inches top and bottom. Bushed for steam or water as per specifications.

Connections—Both steam and water—extra heavy 1½-inch right and left threaded nipples at top and bottom.

* Add ½ inch to length for each bushing.

AMERICAN CORTO RADIATORS

Four-Tube



WIDTH, 6⁵⁄₁₆ INCHES; CENTERS, 2½ INCHES

Number of Sections	* Length 2½ Inches Per Section	Heating Surface—Square Feet Based upon Engineering Standard of 240 B.t.u. emission per Square Foot per Hour				
		20-inch Height 2¼ Sq. Ft. Per Section	23-inch Height 2½ Sq. Ft. Per Section	26-inch Height 2¾ Sq. Ft. Per Section	32-inch Height 3½ Sq. Ft. Per Section	38-inch Height 4¼ Sq. Ft. Per Section
2	5	4½	5	5½	7	8½
3	7½	6¾	7½	8¼	10½	12¾
4	10	9	10	11	14	17
5	12½	11¼	12½	13¾	17½	21¼
6	15	13½	15	16½	21	25½
7	17½	15¾	17½	19¼	24½	29¾
8	20	18	20	22	28	34
9	22½	20¼	22½	24¾	31½	38¼
10	25	22½	25	27½	35	42½
11	27½	24¾	27½	30¼	38½	46¾
12	30	27	30	33	42	51
13	32½	29¼	32½	35¾	45½	55¼
14	35	31½	35	38½	49	59½
15	37½	33¾	37½	41¼	52½	63¾
16	40	36	40	44	56	68
17	42½	38¼	42½	46¾	59½	72¼
18	45	40½	45	49½	63	76½
19	47½	42¾	47½	52¼	66½	80¾
20	50	45	50	55	70	85
21	52½	47¼	52½	57¾	73½	98¼
22	55	49½	55	60½	77	93½
23	57½	51¾	57½	63¼	80½	97¾
24	60	54	60	66	84	102
25	62½	56¼	62½	68¾	87½	106¼
26	65	58½	65	71½	91	110½
27	67½	60¾	67½	74¼	94½	114¾
28	70	63	70	77	98	119
29	72½	65¼	72½	79¾	101½	123¼
30	75	67½	75	82½	105	127½

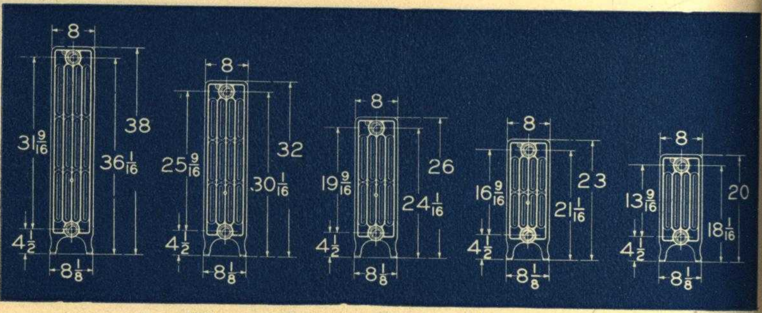
TAPPINGS—1½ inches top and bottom. Bushed for steam or water as per specifications.

CONNECTIONS—Both steam and water—extra heavy 1½-inch right and left threaded nipples at top and bottom.

* Add ½ inch to length for each bushing.

AMERICAN CORTO RADIATORS

Five-Tube



WIDTH, 8 INCHES; CENTERS, 2½ INCHES

Number of Sections	* Length 2½ Inches Per Section	HEATING SURFACE—SQUARE FEET Based upon Engineering Standard of 240 B.t.u. emission per Square Foot per Hour				
		20-inch Height 2⅔ Sq. Ft. Per Section	23-inch Height 3 Sq. Ft. Per Section	26-inch Height 3½ Sq. Ft. Per Section	32-inch Height 4⅓ Sq. Ft. Per Section	38-inch Height 5 Sq. Ft. Per Section
2	5	5⅓	6	7	8⅔	10
3	7½	8	9	10½	13	15
4	10	10⅔	12	14	17⅓	20
5	12½	13⅓	15	17½	21⅔	25
6	15	16	18	21	26	30
7	17½	18⅔	21	24½	30⅓	35
8	20	21⅓	24	28	34⅔	40
9	22½	24	27	31½	39	45
10	25	26⅔	30	35	43⅓	50
11	27½	29⅓	33	38½	47⅔	55
12	30	32	36	42	52	60
13	32½	34⅔	39	45½	56⅓	65
14	35	37⅓	42	49	60⅔	70
15	37½	40	45	52½	65	75
16	40	42⅔	48	56	69⅓	80
17	42½	45⅓	51	59½	73⅔	85
18	45	48	54	63	78	90
19	47½	50⅔	57	66½	82⅓	95
20	50	53⅓	60	70	86⅔	100
21	52½	56	63	73½	91	105
22	55	58⅔	66	77	95⅓	110
23	57½	61⅓	69	80½	99⅔	115
24	60	64	72	84	104	120
25	62½	66⅔	75	87½	108⅓	125
26	65	69⅓	78	91	112⅔	130
27	67½	72	81	94½	117	135
28	70	74⅔	84	98	121⅓	140
29	72½	77⅓	87	101½	125⅔	145
30	75	80	90	105	130	150

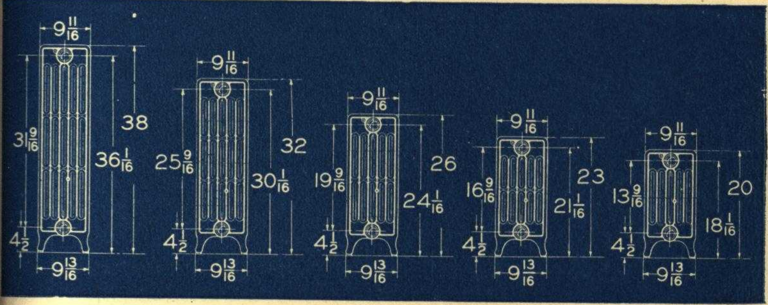
TAPPINGS—1½ inches top and bottom. Bushed for steam or water as per specifications.

CONNECTIONS—Both steam and water—extra heavy 1½-inch right and left threaded nipples at top and bottom.

* Add ½ inch to length for each bushing.

AMERICAN CORTO RADIATORS

Six-Tube



WIDTH, 9 11/16 INCHES; CENTERS, 2½ INCHES

Number of Sections	* Length 2½ Inches Per Section	HEATING SURFACE—SQUARE FEET Based upon Engineering Standard of 240 B.t.u. emission per Square Foot per Hour				
		20-inch Height 3 Sq. Ft. Per Section	23-inch Height 3½ Sq. Ft. Per Section	26-inch Height 4 Sq. Ft. Per Section	32-inch Height 5 Sq. Ft. Per Section	38-inch Height 6 Sq. Ft. Per Section
2	5	6	7	8	10	12
3	7½	9	10½	12	15	18
4	10	12	14	16	20	24
5	12½	15	17½	20	25	30
6	15	18	21	24	30	36
7	17½	21	34½	28	35	42
8	20	24	28	32	40	48
9	22½	27	31½	36	45	54
10	25	30	35	40	50	60
11	27½	33	38½	44	55	66
12	30	36	42	48	60	72
13	32½	39	45½	52	65	78
14	35	42	49	56	70	84
15	37½	45	52½	60	75	90
16	40	48	56	64	80	96
17	42½	51	59½	68	85	102
18	45	54	63	72	90	108
19	47½	57	66½	76	95	114
20	50	60	70	80	100	120
21	52½	63	73½	84	105	126
22	55	66	77	88	110	132
23	57½	69	80½	92	115	138
24	60	72	84	96	120	144
25	62½	75	87½	100	125	150
26	65	78	91	104	130	156
27	67½	81	94½	108	135	162
28	70	84	98	112	140	168
29	72½	87	101½	116	145	174
30	75	90	105	120	150	180

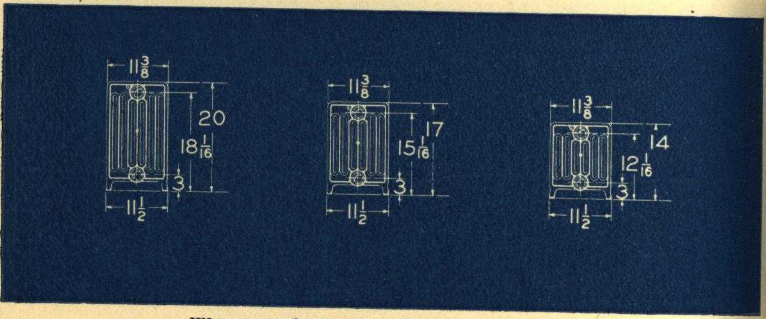
TAPPINGS—1½ inches top and bottom. Bushed for steam or water as per specifications.

CONNECTIONS—Both steam and water—extra heavy 1½-inch right and left threaded nipples at top and bottom.

* Add ½ inch to length for each bushing.

AMERICAN CORTO WINDOW RADIATORS

Seven-Tube



Width, 11⅜ Inches; Centers, 2½ Inches

Number of Sections	* Length 2½ Inches Per Section	Heating Surface—Square Feet Based upon Engineering Standard of 240 B.t.u. emission per Square Foot per Hour		
		14-inch Height 2½ Sq. Ft. Per Section	17-inch Height 3 Sq. Ft. Per Section	20-inch Height 3⅔ Sq. Ft. Per Section
2	5	5	6	7⅓
3	7½	7½	9	11
4	10	10	12	14⅔
5	12½	12½	15	18⅓
6	15	15	18	22
7	17½	17½	21	25⅔
8	20	20	24	29⅓
9	22½	22½	27	33
10	25	25	30	36⅔
11	27½	27½	33	40⅓
12	30	30	36	44
13	32½	32½	39	47⅔
14	35	35	42	51⅓
15	37½	37½	45	55
16	40	40	48	58⅔
17	42½	42½	51	62⅓
18	45	45	54	66
19	47½	47½	57	69⅔
20	50	50	60	73⅓
21	52½	52½	63	77
22	55	55	66	80⅔
23	57½	57½	69	84⅓
24	60	60	72	88
25	62½	62½	75	91⅔
26	65	65	78	95⅓
27	67½	67½	81	99
28	70	70	84	102⅔
29	72½	72½	87	106⅓
30	75	75	90	110

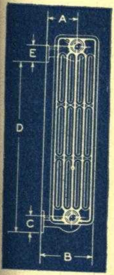
Tappings—1½ inches top and bottom. Bushed for steam or water as per specifications.

Connections—Both steam and water—extra heavy 1½-inch right and left threaded nipples at top and bottom.

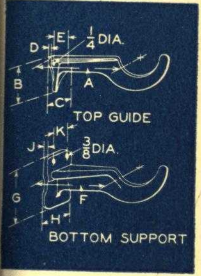
* Add ½ inch to length for each bushing.

AMERICAN CORTO CONCEALED RADIATOR BRACKETS

DIMENSIONS



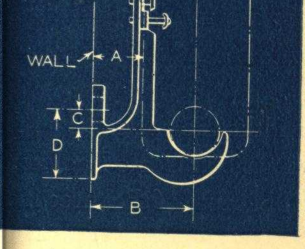
Type of Radiator	A	B	C	E	D 14	D 17	D 20	D 23	D 26	D 32	D 38
Three Tube	3 11/16	6	2 15/16	2 7/16	. . .	. . . .	14 1/16	17 1/16	20 1/16	26 1/16	32
Four Tube	4 1/2	7 5/8	2 15/16	2 7/16	. . .	. . . .	14 1/16	17 1/16	20 1/16	26 1/16	32
Five Tube	5 3/8	9 3/8	2 15/16	2 7/16	. . .	. . . .	14 1/16	17 1/16	20 1/16	26 1/16	32
Six Tube	6 3/16	11	2 15/16	2 7/16	. . .	. . . .	14 1/16	17 1/16	20 1/16	26 1/16	32
Seven Tube Window	7	12 11/16	2 15/16	2 7/16	9 9/16	12 9/16	15 9/16	. . .	. . .	. . .	. . .



Type of Radiator	Top Bracket A	Top Bracket B	Top Bracket C	Top Bracket D	Top Bracket E	Bottom Bracket F	Bottom Bracket G	Bottom Bracket H	Bottom Bracket J	Bottom Bracket K
Three Tube	3 11/16	2 5/8	1 3/4	5/16	1	3 11/16	4 3/8	2 1/4	1/2	1 1/4
Four Tube.	4 1/2	2 5/8	1 3/4	5/16	1	4 1/2	4 3/8	2 1/4	1/2	1 1/4
Five Tube. .	5 3/8	2 5/8	1 3/4	5/16	1	5 3/8	4 3/8	2 1/4	1/2	1 1/4
Six Tube. .	6 3/16	2 5/8	1 3/4	5/16	1	6 3/16	4 3/4	2 1/4	1/2	1 1/4
Seven Tube Window.	7	2 5/8	1 3/4	5/16	1	7	4 3/8	2 1/4	1/2	1 1/4

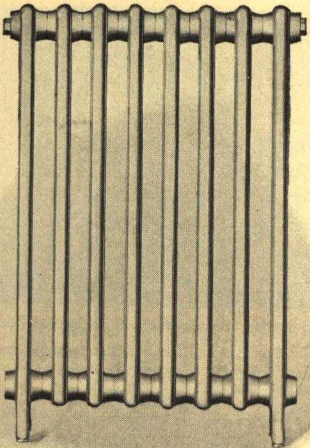
AMERICAN CORTO MALLEABLE RADIATOR BRACKETS

DIMENSIONS



Dimension "A" Inches	2	3	4	5
	DIMENSION "B"			
Three Tube.	4 5/16	5 5/16	6 5/16	7 5/16
Four Tube.	5 3/16	6 3/16	7 3/16	8 3/16
Five Tube.	6	7	8	9
Six Tube.	6 7/8	7 7/8	8 7/8	9 7/8
Seven Tube Window. .	7 3/4	8 3/4	9 3/4	10 3/4
Dimension "C".	7/8	1 3/8	1 3/8	1 3/8
Dimension "D".	4 3/8	4 3/8	4 3/8	4 3/8

AMERICAN CORTO HOSPITAL RADIATORS



Special for Hospital and Sanitarium Use

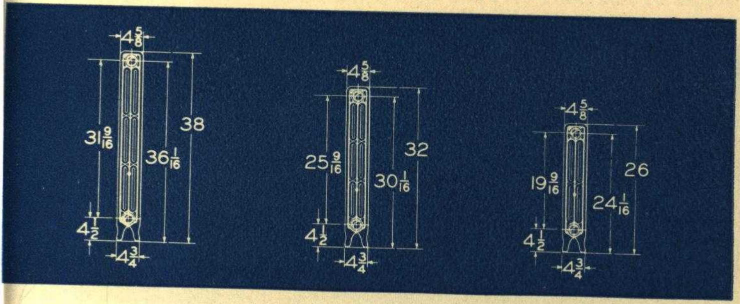
SANITARY conditions in hospitals and sanitariums demand a radiator that is accessible for easy and thorough cleaning. American Corto Hospital Radiators meet this need with well-spaced sections measuring three inches from center to center.

American Corto Hospital Radiators are regularly furnished without bead, and in three and five tube, 38-inch, 32-inch, and 26-inch patterns only.

The heating surface, heights and widths are the same as for corresponding patterns of standard American Corto Radiators. The lengths are twenty per cent greater because of the three-inch center to center sections.

AMERICAN CORTO HOSPITAL RADIATORS

Three-Tube



WIDTH, 4⅝ INCHES; CENTERS, 3 INCHES

Number of Sections	* Length 3 Inches Per Section	HEATING SURFACE—SQUARE FEET Based upon Engineering Standard of 240 B.t.u. emission per Square Foot per Hour		
		26-inch Height 2⅓ Sq. Ft. Per Section	32-inch Height 3 Sq. Ft. Per Section	38-inch Height 3½ Sq. Ft. Per Section
2	6	4⅔	6	7
3	9	7	9	10½
4	12	9⅓	12	14
5	15	11⅔	15	17½
6	18	14	18	21
7	21	16⅓	21	24½
8	24	18⅔	24	28
9	27	21	27	31½
10	30	23⅓	30	35
11	33	25⅔	33	38½
12	36	28	36	42
13	39	30⅓	39	45½
14	42	32⅔	42	49
15	45	35	45	52½
16	48	37⅓	48	56
17	51	39⅔	51	59½
18	54	42	54	63
19	57	44⅓	57	66½
20	60	46⅔	60	70
21	63	49	63	73½
22	66	51⅓	66	77
23	69	53⅔	69	80½
24	72	56	72	84
25	75	58⅓	75	87½
26	78	60⅔	78	91
27	81	63	81	94½
28	84	65⅓	84	98
29	87	67⅔	87	101½
30	90	70	90	105

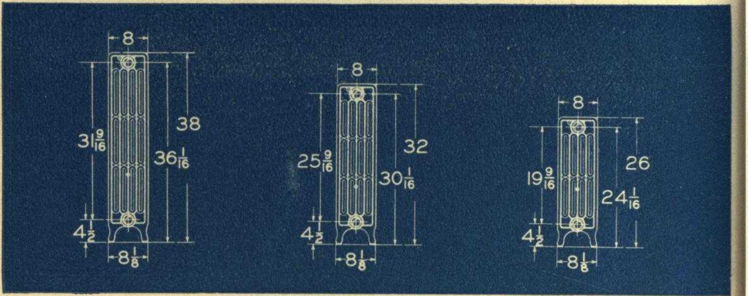
TAPPINGS—1½ inches top and bottom. Bushed for steam or water as per specifications.

CONNECTIONS—Both steam and water—extra heavy 1½-inch right and left threaded nipples at top and bottom.

* Add ½ inch to length for each bushing.

AMERICAN CORTO HOSPITAL RADIATORS

Five-Tube



WIDTH, 8 INCHES; CENTERS, 3 INCHES

Number of Sections	* Length 3 Inches Per Section	HEATING SURFACE—SQUARE FEET Based upon Engineering Standard of 240 B.t.u. emission per Square Foot per Hour		
		26-inch Height 3½ Sq. Ft. Per Section	32-inch Height 4⅓ Sq. Ft. Per Section	38-inch Height 5 Sq. Ft. Per Section
2	6	7	8⅔	10
3	9	10½	13	15
4	12	14	17⅓	20
5	15	17½	21⅔	25
6	18	21	26	30
7	21	24½	30⅓	35
8	24	28	34⅔	40
9	27	31½	39	45
10	30	35	43⅓	50
11	33	38½	47⅔	55
12	36	42	52	60
13	39	45½	56⅓	65
14	42	49	60⅔	70
15	45	52½	65	75
16	48	56	69⅓	80
17	51	59½	73⅔	85
18	54	63	78	90
19	57	66½	82⅓	95
20	60	70	86⅔	100
21	63	73½	91	105
22	66	77	95⅓	110
23	69	80½	99⅔	115
24	72	84	104	120
25	75	87½	108⅓	125
26	78	91	112⅔	130
27	81	94½	117	135
28	84	98	121⅓	140
29	87	101½	125⅔	145
30	90	105	130	150

TAPPINGS—1½ inches top and bottom. Bushed for steam or water as per specifications.

CONNECTIONS—Both steam and water—extra heavy 1½-inch right and left threaded nipples at top and bottom.

* Add ½ inch to length for each bushing.

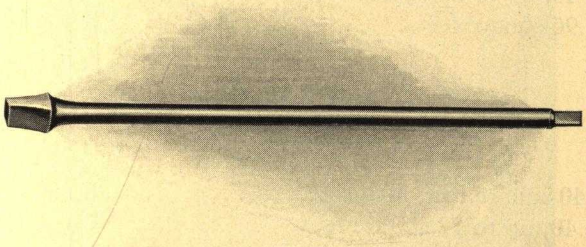
SPECIAL LEGS

American Corto Radiation, Three-, Four-, Five- and Six-Tube, and American Corto Hospital Radiation, Three- and Five-Tube, can be supplied on special order with six inch (6″) legs, or without legs, at no extra charge. American Corto Window Radiation can be supplied on special order with four and one-half inch (4½″) legs, or without legs, at no extra charge. No other special legs can be supplied.

SPECIAL RADIATORS

All patterns of American Corto Radiators can be furnished in curved, corner, or angle patterns on special order at extra cost. Complete information, including plan sketch with necessary dimensions for production, must accompany order.

DIRECT RADIATOR WRENCH



These steel wrenches are made especially for assembling or disassembling direct Radiators connected with right- and left-hand threaded nipples. Made in two lengths—2-foot and 4-foot.

VENTO AND INDIRECT RADIATOR WRENCH

These drop-forged steel wrenches are made especially for assembling Vento and Indirect Radiators connected with right- and left-hand threaded nipples having hexagon nut at center. Made for 1½- 2-, 2½- or 3-inch nipple openings.

Tappings and Measurements

Standard Tappings

One-Pipe Steam Work—Supply

Up to 24 square feet, inclusive	1 -inch
Above 24, up to 60 square feet	1¼-inch
Above 60 square feet	1½-inch

Two-Pipe Work—Supply and Return

Up to 48 square feet, inclusive	1 x ¾-inch
Above 48, up to 96 square feet	1¼ x 1 -inch
Above 96 square feet	1½ x 1¼-inch

Water Radiators

Tapped for Supply and Return

Up to 40 square feet, inclusive	1 x 1 -inch
Above 40, up to 72 square feet	1¼ x 1¼-inch
Above 72 square feet	1½ x 1½-inch

Air Valve and Vapor Tappings

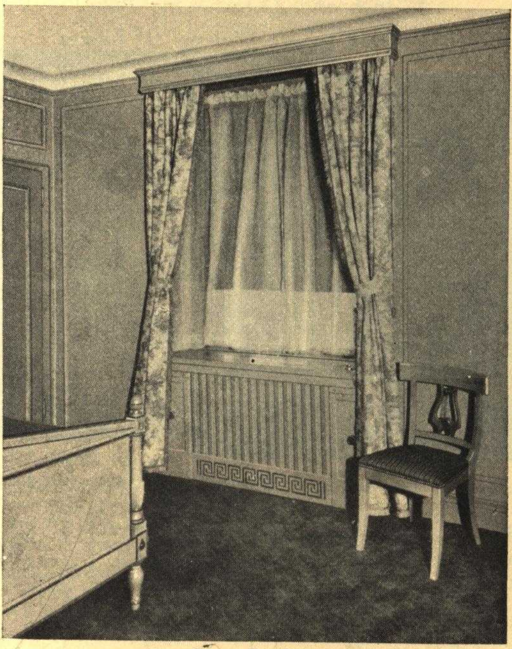
All air-valve tappings of Direct Radiators are regularly made ⅛-inch.

Vapor tappings, top and bottom opposite ends; supply ¾-inch, return ½-inch.

Threads of Openings

Unless otherwise ordered, all openings of Direct Radiators will have right-hand threads (except that of Wall Radiators where tapped 1½-inch, in which case tapping at one end is right-hand and left-hand on other end).

THE AMERICAN FANTOM RADIATOR



Patent Pending

American Fantom Radiator—Campbell Metal Window Unit in the Savoy Plaza Hotel, New York City

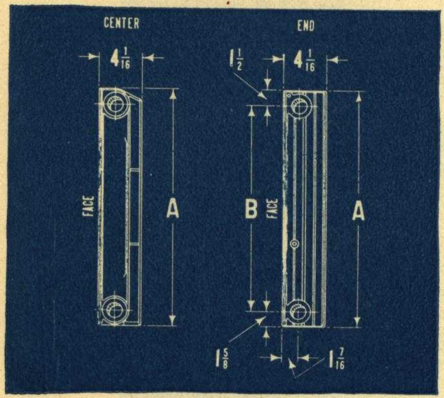
THE American Fantom Radiator has been designed to be recessed beneath a window without the usual loss of heating effectiveness. It occupies but about one-third the room space required by a radiator standing in the open. Its large, unshielded surface radiates heat throughout the lower part of the room where it is needed for comfort. Its simple, straight lines give it the pleasing effect of being an integral part of the room.

An especially efficient and attractive combination is that of American Fantom Radiator and Campbell Metal Window as illustrated above. Arrangements of this unit are shown on pages B21-B23.

AMERICAN FANTOM RADIATORS

17-Inch and 23-Inch One Tube

WIDTH 4 1/16 INCHES; CENTERS 2½ INCHES



	A	B
17-Inch....	17 1/16	13 15/16
23-Inch....	22 13/16	19 11/16

TAPPINGS—1¼ inches top and bottom. Bushed for steam or water as per specifications.

CONNECTIONS—Both steam and water—extra heavy 1¼-inch right and left threaded nipples at top and bottom.

Number of Sections	* Length Over All Inches	† 17 Inches Height 1¾ Square Feet Per Section	† 23 Inches Height 2¼ Square Feet Per Section
2	4½	3½	4½
3	7	5¼	6¾
4	9½	7	9
5	12	8¾	11¼
6	14½	10½	13½
7	17	12¼	15¾
8	19½	14	18
9	22	15¾	20¼
10	24½	17½	22½
11	27	19¼	24¾
12	29½	21	27
13	32	22¾	29¼
14	34½	24½	31½
15	37	26¼	33¾
16	39½	28	36
17	42	29¾	38¼
18	44½	31½	40½
19	47	33¼	42¾
20	49½	35	45
21	52	36¾	47¼
22	54½	38½	49½
23	57	40¼	51¾
24	59½	42	54
25	62	43¾	56¼

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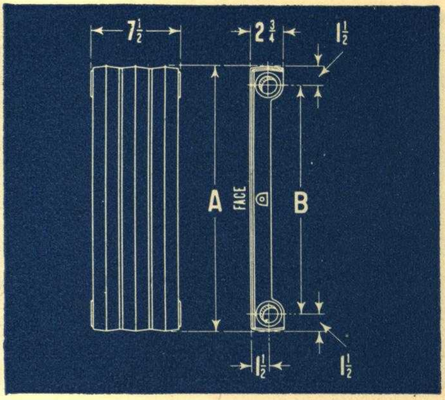
* Add ½ inch to length for each bushing.

† Based on Engineering Standards of 215 degrees Fahrenheit steam temperature, 70 degrees room temperature and 240 B.t.u. per square foot per hour.

AMERICAN FANTOM RADIATORS

17-Inch and 23-Inch Two Tube

WIDTH 2¾ INCHES; CENTERS 7½ INCHES



	A	B
17-Inch.....	17	14
23-Inch.....	22¾	19¾

TAPPINGS—1¼ inches top and bottom. Bushed for steam or water as per specifications.

NOTE: Two Tube Fantom Radiators used for water systems are to be vented through tapped Top Plug provided on specification.

CONNECTIONS—Both steam and water—extra heavy 1¼-inch right and left threaded nipples at top and bottom.

Number of Sections	* Length Over All Inches	† 17 Inches Height 3⅓ Square Feet Per Section	† 23 Inches Height 4¼ Square Feet Per Section
2	15	6⅔	8½
3	22½	10	12¾
4	30	13⅓	17
5	37½	16⅔	21¼
6	45	20	25½
7	52½	23⅓	29¾
8	60	26⅔	34
9	67½	30	38¼
10	75	33⅓	42½
11	82½	36⅔	46¾
12	90	40	51
13	97½	43⅓	55¼
14	105	46⅔	59½
15	112½	50	63¾
16	120	53⅓	68

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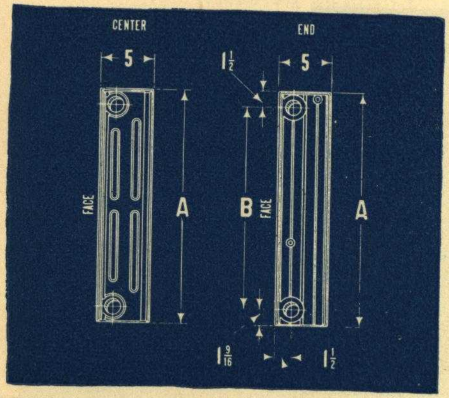
* Add ½ inch to length for each bushing.

† Based on Engineering Standards of 215 degrees Fahrenheit steam temperature, 70 degrees room temperature and 240 B.t.u. per square foot per hour.

AMERICAN FANTOM RADIATORS

17-Inch, 20-Inch and 23-Inch Three Tube

WIDTH 5 INCHES; CENTERS 2½ INCHES



	A	B
17-Inch	17	13 15/16
20-Inch	20	16 15/16
23-Inch	22¾	19 11/16

TAPPING—1¼ inches top and bottom. Bushed for steam or water as per specifications.

CONNECTIONS—Both steam and water—extra heavy 1¼-inch right and left threaded nipples top and bottom.

Number of Sections	* Length Over All Inches	† 17 Inches Height 2 Square Feet Per Section	† 20 Inches Height 2⅓ Square Feet Per Section	† 23 Inches Height 2⅔ Square Feet Per Section
2	4½	4	4⅔	5⅓
3	7	6	7	8
4	9½	8	9⅓	10⅔
5	12	10	11⅔	13⅓
6	14½	12	14	16
7	17	14	16⅓	18⅔
8	19½	16	18⅔	21⅓
9	22	18	21	24
10	24½	20	23⅓	26⅔
11	27	22	25⅔	29⅓
12	29½	24	28	32
13	32	26	30⅓	34⅔
14	34½	28	32⅔	37⅓
15	37	30	35	40
16	39½	32	37⅓	42⅔
17	42	34	39⅔	45⅓
18	44½	36	42	48
19	47	38	44⅓	50⅔
20	49½	40	46⅔	53⅓
21	52	42	49	56
22	54½	44	51⅓	58⅔
23	57	46	53⅔	61⅓
24	59½	48	56	64
25	62	50	58⅓	66⅔

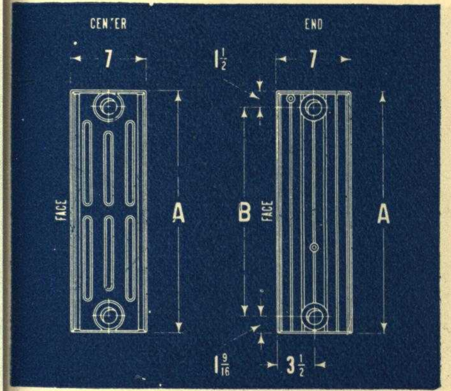
* Add ½ inch to length for each bushing.

† Based on Engineering Standards of 215 degrees Fahrenheit steam temperature, 70 degrees room temperature and 240 degrees B.t.u. per square foot per hour.

AMERICAN FANTOM RADIATORS

17-Inch and 23-Inch Four Tube

WIDTH 7 INCHES; CENTERS 2½ INCHES



	A	B
17-Inch.....	17	13 15/16
23-Inch.....	22¾	19 11/16

TAPPINGS—1¼ inch top and bottom. Bushed for steam or water as per specifications.

CONNECTIONS—Both steam and water—extra heavy 1¼-inch right and left threaded nipples at top and bottom.

Number of Sections	* Length Over All Inches	† 17 Inches Height 2⅔ Square Feet Per Section	† 23 Inches Height 3⅓ Square Feet Per Section
2	4½	5⅓	6⅔
3	7	8	10
4	9½	10⅔	13⅓
5	12	13⅓	16⅔
6	14½	16	20
7	17	18⅔	23⅓
8	19½	21⅓	26⅔
9	22	24	30
10	24½	26⅔	33⅓
11	27	29⅓	36⅔
12	29½	32	40
13	32	34⅔	43⅓
14	34½	37⅓	46⅔
15	37	40	50
16	39½	42⅔	53⅓
17	42	45⅓	56⅔
18	44½	48	60
19	47	50⅔	63⅓
20	49½	53⅓	66⅔
21	52	56	70
22	54½	58⅔	73⅓
23	57	61⅓	76⅔
24	59½	64	80
25	62	66⅔	83⅓

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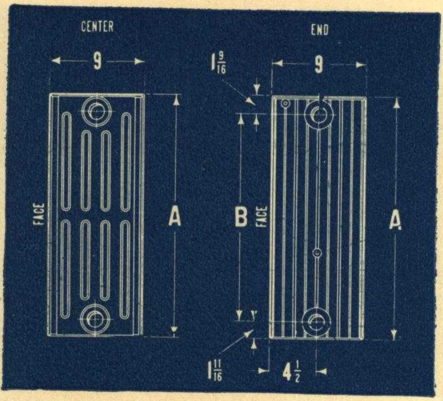
* Add ½ inch to length for each bushing.

† Based on Engineering Standards of 215 degrees Fahrenheit steam temperature, 70 degrees room temperature and 240 B.t.u. per square foot per hour.

AMERICAN FANTOM RADIATORS

17-Inch and 23-Inch Five Tube

WIDTH 9 INCHES; CENTERS 2½ INCHES



	A	B
17-Inch.....	17	13¾
23-Inch.....	22¾	19½

TAPPINGS—1½ inches top and bottom. Bushed for steam or water as per specifications.

CONNECTIONS—Both steam and water—extra heavy 1½-inch right and left threaded nipples at top and bottom.

Number of Sections	* Length Over All Inches	† 17 Inches Height 3¼ Square Feet Per Section	† 23 Inches Height 4 Square Feet Per Section
2	4½	6½	8
3	7	9¾	12
4	9½	13	16
5	12	16¼	20
6	14½	19½	24
7	17	22¾	28
8	19½	26	32
9	22	29¼	36
10	24½	32½	40
11	27	35¾	44
12	29½	39	48
13	32	42¼	52
14	34½	45½	56
15	37	48¾	60
16	39½	52	64
17	42	55¼	68
18	44½	58½	72
19	47	61¾	76
20	49½	65	80
21	52	68¼	84
22	54½	71½	88
23	57	74¾	92
24	59½	78	96
25	62	81¼	100

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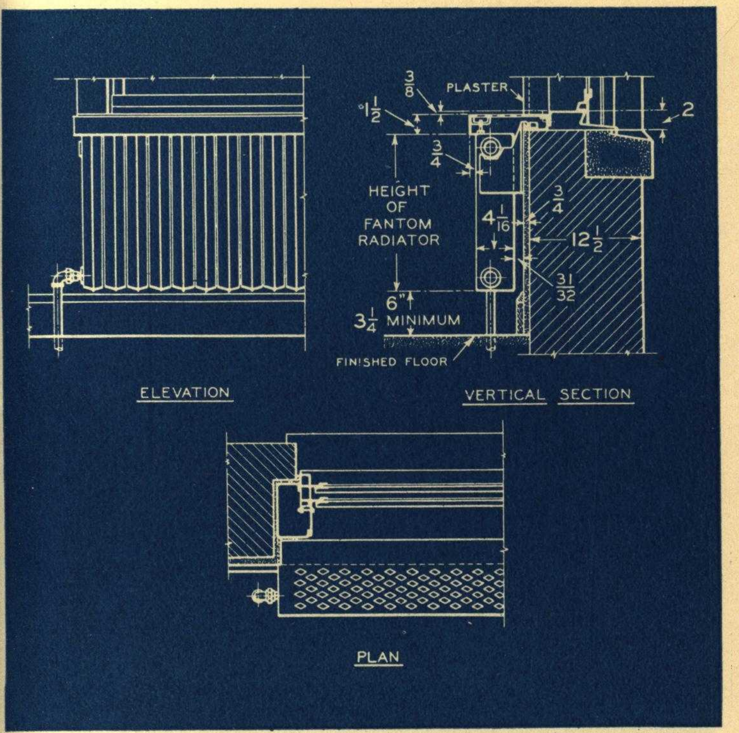
* Add ½ inch to length for each bushing.

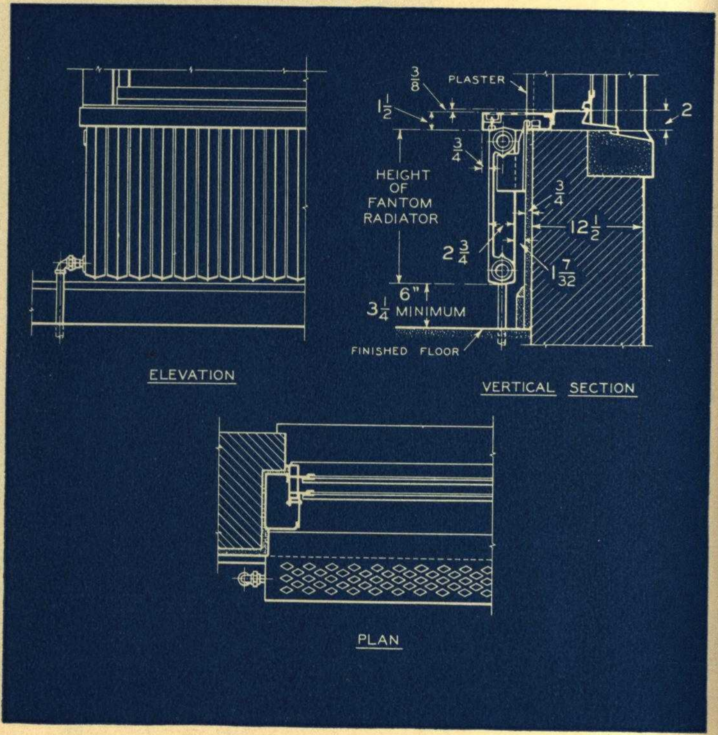
† Based on Engineering Standards of 215 degrees Fahrenheit steam temperature, 70 degrees room temperature and 240 B.t.u. per square foot per hour.

AMERICAN FANTOM RADIATOR AND CAMPBELL METAL WINDOW



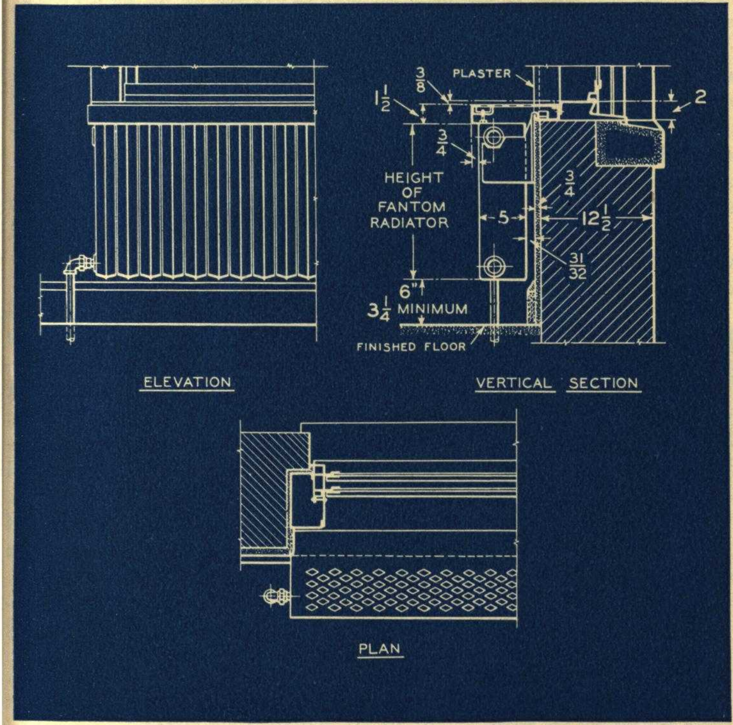
Arrangement of Campbell Residence Type Window and One Tube American Fantom Radiator

AMERICAN FANTOM RADIATOR AND CAMPBELL METAL WINDOW



Arrangement of Campbell Residence Type Window and Two Tube American Fantom Radiator

AMERICAN FANTOM RADIATOR AND CAMPBELL METAL WINDOW



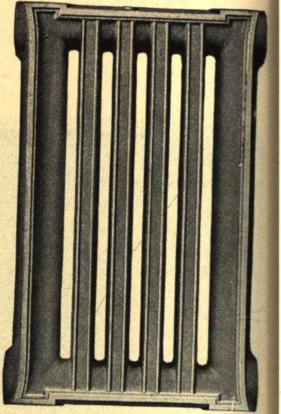
Arrangement of Campbell Residence Type Window and Three Tube American Fantom Radiator.

PEERLESS WALL RADIATORS

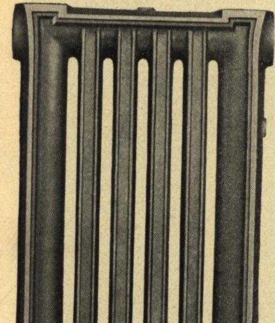
AMERICAN Peerless Wall Radiators are designed to give maximum heating results where radiation space is limited, as in factory work, shops, loft buildings, storehouses, garages, lobbies, corridors, stairways, bath rooms, etc.

These radiators are made in five styles, with provisions for numerous groupings; and may be assembled to meet any structural condition, fitting into restricted spaces of practically any size or shape, under windows or between them, on walls, ceilings or in skylights.

Right- and left-hand threaded hexagon nipples made of malleable iron are supplied for connecting banks of assembled radiators.



No. 7-B



No. 9-B

Peerless Wall Radiators should always be assembled with bars vertical to secure greatest heating efficiency. The 7- and 9-foot Sections are, therefore, made in two styles: Nos. 7-A and 9-A have bars running crosswise of the Section and are regularly tapped for connecting end to end as illustrated. Nos. 7-B and 9-B have bars running lengthwise of the Section and are regularly tapped for connecting side by side as illustrated.

No. 5-A is made with bars running crosswise of the Section only and is regularly tapped for connecting end to end.

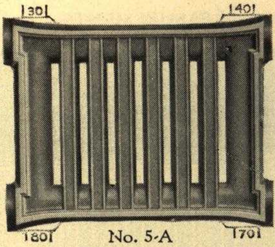
On special order, the No. 5-A, 7-A and 9-A Sections can be furnished with tappings at 30, 40, 70, and 80 as illustrated.

For Ratings and Measurements of Sections and Assemblages see pages B25, B26 and B28.

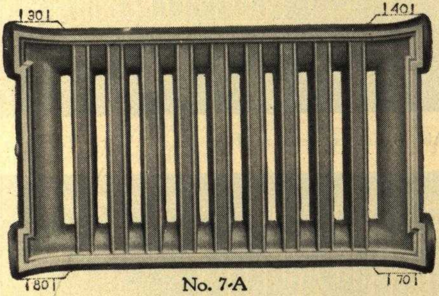
For Methods of Assembling, see pages B25 to B34 inclusive.

For Tappings, Connections, Directions for Ordering, and Shipping Conditions, see page B27.

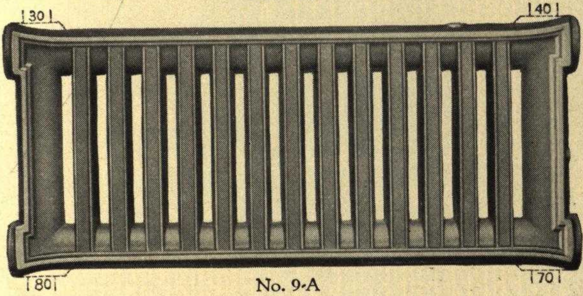
PEERLESS WALL RADIATORS



No. 5-A



No. 7-A



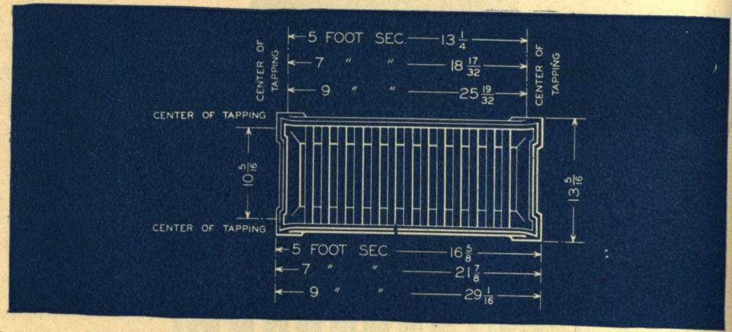
No. 9-A

Rating and Measurement of Sections

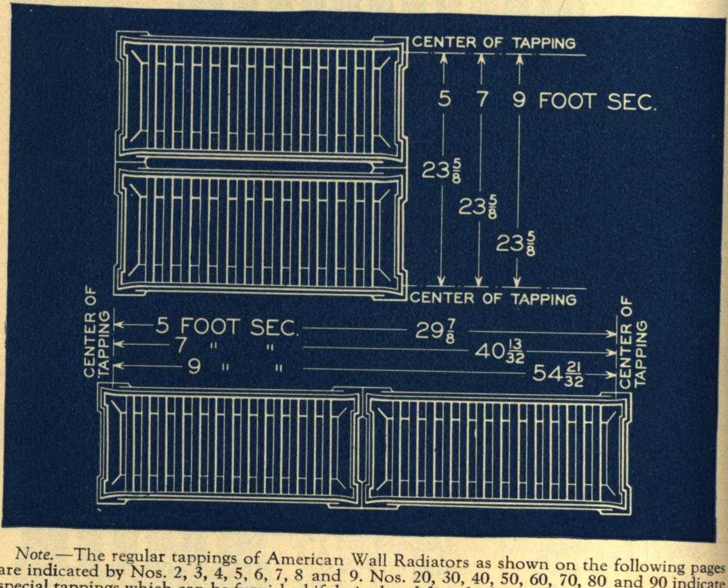
Number of Sections	Height Inches	Length or Width Inches	Thickness Inches	Thickness (with bracket) Inches	Heating Surface Square Feet
5-A	13 5/16	16 5/8	2 7/8	3 1/2	5
7-A	13 5/16	21 7/8	2 7/8	3 1/2	7
7-B	21 7/8	13 5/16	3 1/16	3 11/16	7
9-A	13 5/16	29 1/16	2 7/8	3 1/2	9
9-B	29 1/16	13 5/16	3 1/16	3 11/16	9

PEERLESS WALL RADIATORS

MEASUREMENTS



Above measurements apply to either "A" or "B" styles



Note.—The regular tappings of American Wall Radiators as shown on the following pages are indicated by Nos. 2, 3, 4, 5, 6, 7, 8 and 9. Nos. 20, 30, 40, 50, 60, 70, 80 and 90 indicate special tappings which can be furnished if desired and for which an extra charge will be made. Tappings are 1½ inches, supply and return, and bushed as desired. Add 1⅛ inches to length measurement for each hexagonal nipple used in assembling. See also "Directions for Ordering," page B27. For heating surface in length of space occupied, see page B28.

DIRECTIONS FOR ORDERING

Where higher working pressures (steam or water) than 15 pounds for steam or 30 pounds for water are required, order must specifically so state. In these cases wall radiators are furnished only with outside hexagon nipples.

For convenience in handling and shipping unless otherwise ordered, No. 5-A Radiators will be assembled in stacks not exceeding 6 sections; No. 7-A Radiators in stacks not exceeding 4 sections; No. 9-A Radiators in stacks not exceeding 3 sections; and Nos. 7-B and 9-B Radiators in stacks not exceeding 7 sections.

When fitter intends to erect a stack consisting of more sections than above mentioned, or when the sections or stacks are to be set in rows or series (as shown by illustrations on pages B29 to B34), we provide a right- and left-hand threaded nipple *having hexagon nut at center*, enabling the fitter to easily connect the stacks or rows on the job.

Peerless Wall Radiation is tapped 1½-inch supply and return and bushed as desired. It is connected with 1½-inch right- and left-hand threaded internal nipples. These nipples have two heavy inside lugs so that an ordinary piece of 1-inch round iron flattened at one end the length of nipple, can be inserted to any desired point in the Radiator, and by applying an ordinary wrench to bar, the nipple can be screwed or unscrewed and one or more sections may be added or taken out independently of all the others in the stack. We can furnish these bars (Direct Radiator Wrenches) in sizes as noted on page B13.

Orders should refer to figure number showing assemblage (see pages B29 to B34.) The figures shown on these pages illustrate the common ways of assembling comparatively small units, but wall radiators can be assembled in any number of sections, either longer or higher, than shown in the figures. It is our practice, however, when a greater number of sections of a given figure than exactly shown in the figure, are specified, to always build onto the length, maintaining the height as shown in the figure. The safe way in ordering is always to send sketch unless you are ordering exactly the number of sections as shown in the figure.

TABLE SHOWING LENGTH OF SPACE OCCUPIED—AND HEATING SURFACE FOR VARIOUS SIZES AND ASSEMBLAGES OF PEERLESS WALL RADIATORS

Number of Sections	Length of Space Occupied				Heating Surface, Square Feet		
	Type 5-A Feet Inches	Type 7-A Feet Inches	Type 9-A Feet Inches	Types 7-B, 9-B Feet Inches	Type 5	Type 7	Type 9
1	1– 4 5/8	1– 9 7/8	2– 5 1/16	1– 1 5/16	5	7	9
2	2– 9 1/4	3– 7 3/4	4–10 1/8	2– 2 5/8	10	14	18
3	4– 1 7/8	5– 5 5/8	7– 3 3/16	3– 3 15/16	15	21	27
4	5– 6 1/2	7– 3 1/2	9– 8 1/4	4– 5 1/4	20	28	36
5	6–11 1/8	9– 1 3/8	12– 1 5/16	5– 6 9/16	25	35	45
6	8– 3 3/4	10–11 1/4	14– 6 3/8	6– 7 7/8	30	42	54
7	9– 8 3/8	12– 9 1/8	16–11 7/16	7– 9 3/16	35	49	63
8	11– 1	14– 7	19– 4 1/2	8–10 1/2	40	56	72
9	12– 5 5/8	16– 4 7/8	21– 9 9/16	9–11 13/16	45	63	81
10	13–10 1/4	18– 2 3/4	24– 2 5/8	11– 1 1/8	50	70	90
11	15– 2 7/8	20– 0 5/8	26– 7 11/16	12– 2 7/16	55	77	99
12	16– 7 1/2	21–10 1/2	29– 0 3/4	13– 3 3/4	60	84	108
13	18– 0 1/8	23– 8 3/8	31– 5 13/16	14– 5 1/16	65	91	117
14	19– 4 3/4	25– 6 1/4	33–10 7/8	15– 6 3/8	70	98	126
15	20– 9 3/8	27– 4 1/8	36– 3 15/16	16– 7 11/16	75	105	135
16	22– 2	29– 2	38– 9	17– 9	80	112	144
17	23– 6 5/8	30–11 7/8	41– 2 1/16	18–10 5/16	85	119	153
18	24–11 1/4	32– 9 3/4	43– 7 1/8	19–11 5/8	90	126	162
19	26– 3 7/8	34– 7 5/8	46– 0 3/16	21– 0 15/16	95	133	171
20	27– 8 1/2	36– 5 1/2	48– 5 1/4	22– 2 1/4	100	140	180
21	29– 1 1/8	38– 3 3/8	50–10 5/16	23– 3 9/16	105	147	189
22	30– 5 3/4	40– 1 1/4	53– 3 3/8	24– 4 7/8	110	154	198
23	31–10 3/8	41–11 1/8	55– 8 7/16	25– 6 3/16	115	161	207
24	33– 3	43– 9	58– 1 1/2	26– 7 1/2	120	168	216
25	34– 7 5/8	45– 6 7/8	60– 6 9/16	27– 8 13/16	125	175	225
26	36– 0 1/4	47– 4 3/4	62–11 5/8	28–10 1/8	130	182	234

To these lengths add 1/2 inch for each end bushed and 1 1/8 inches for each Hexagon Nipple used in assembling.

PEERLESS WALL RADIATORS

Key to Figure Numbering

The first numeral in each of the following Figure Numbers indicates the size of section, thus: —Figure 515 means 5 foot sections arranged in the manner as shown in sketch above the number; Figure 717 refers to 7 foot sections and to the same assemblage, and Figure 917 refers to 9 foot sections and to the same assemblage.

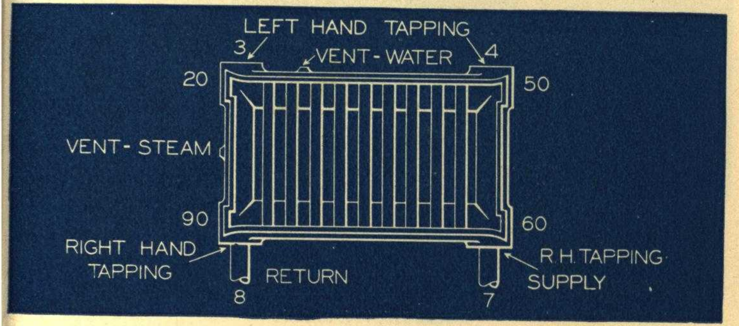


Figure 51, 71, or 91
Water and One- and Two-Pipe Steam

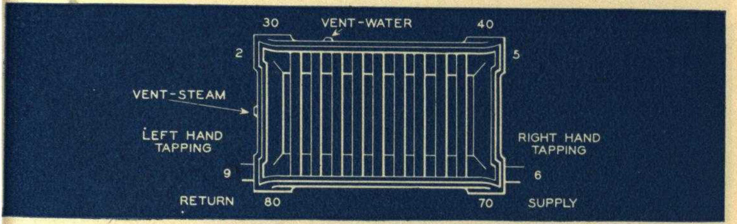


Figure 57, 77, or 97
Water and One- and Two-Pipe Steam

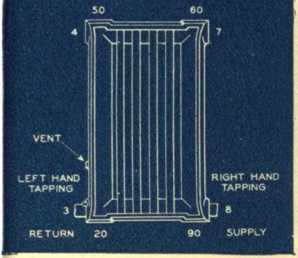


Figure 74 or 94
One- and Two-Pipe Steam

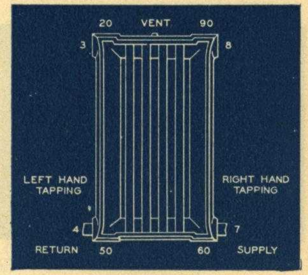


Figure 78 or 98
Water

PEERLESS WALL RADIATORS

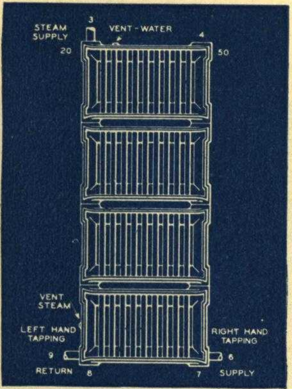


FIGURE 515, 715, or 915
Assembled Four Sections in Four Tiers—Water and Two-Pipe Steam

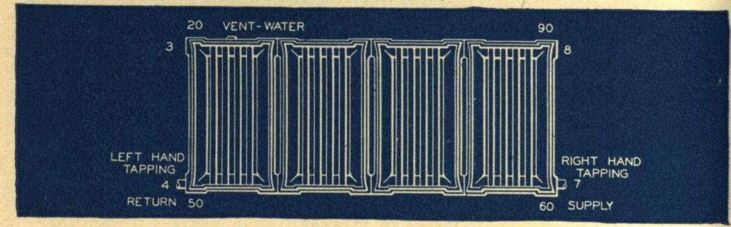


FIGURE 717 OR 917
Assembled Four Sections in Single Tier—Water

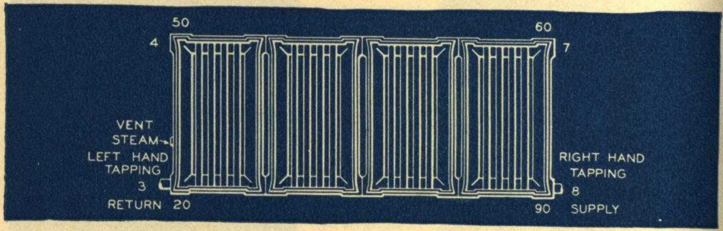


FIGURE 718 OR 918
Sections in Single Tier—One-and Two-Pipe Steam

See note on Tappings, page B27. Also see pages B26 and B28.

PEERLESS WALL RADIATORS

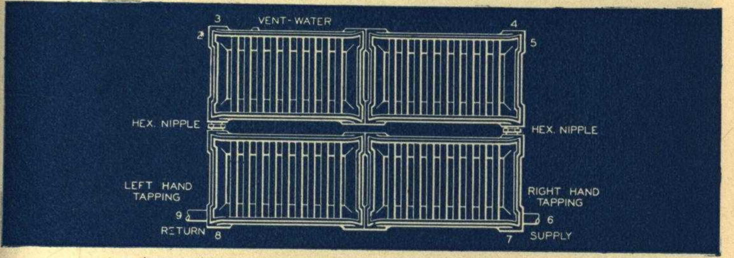


FIGURE 521, 721, or 921
Assembled Four Sections in Two Tiers—Water

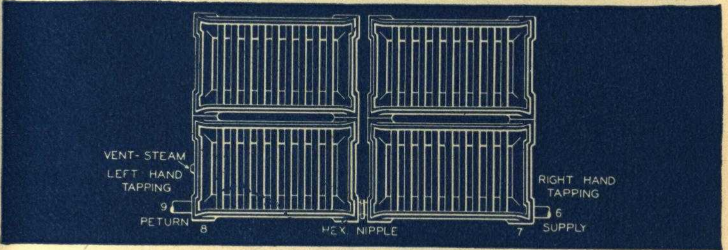


FIGURE 522, 722, or 922
Assembled Four Sections in Two Tiers—One- and Two-Pipe Steam

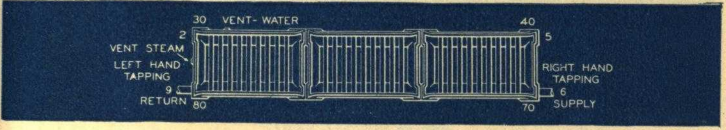


FIGURE 511, 711, or 911. Assembled Three Sections in Single Tier—Water and One-and Two-Pipe Steam

See note on Tappings, page B27. Also see pages B26 and B28.

PEERLESS WALL RADIATORS

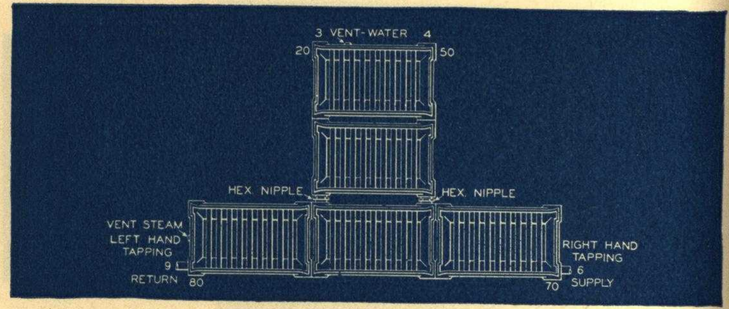


FIGURE 523, 723, or 923
Assembled Three and Two Sections with Three Tiers in Center—Water and One- and Two-Pipe Steam

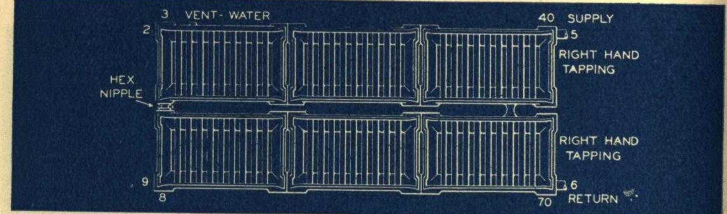


FIGURE 531, 731, or 931
Assembled Six Sections in Two Tiers—Water
Always indicate points at which tappings are required

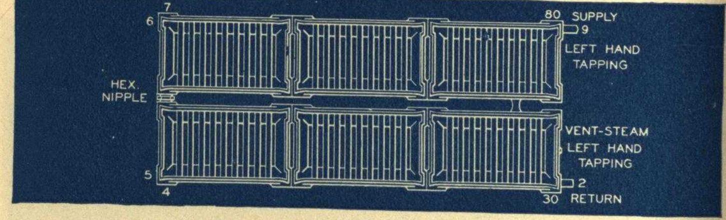


FIGURE 532, 732, or 932
Assembled Six Sections in Two Tiers—Two-Pipe Steam.
Always indicate points at which tappings are required.
See note on Tappings, page B27. Also see pages B26 and B28.

PEERLESS WALL RADIATORS

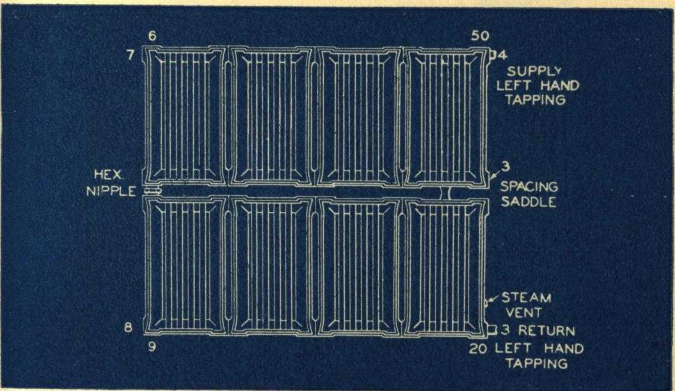


Figure 740 or 940

Assembled in Eight Sections in Two Tiers—for Two-Pipe Steam—Using Spacing Saddle.
For Water, specify Figure 725.
Indicate points at which tappings are required.

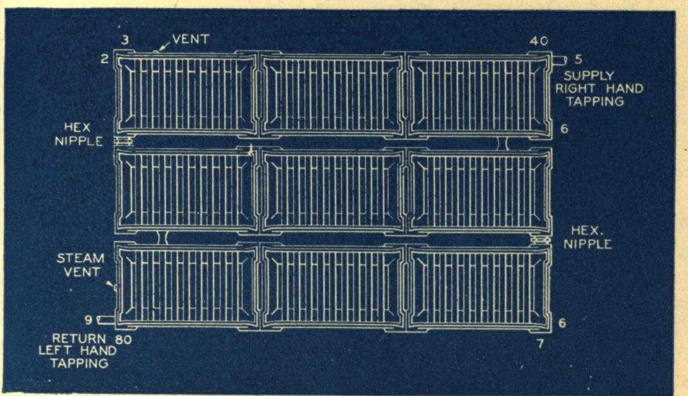


Figure 541, 741, or 941

Assembled Nine Sections in Three Tiers—Using Spacing Saddle.
Indicate points at which tappings are required.
See note on Tappings, page B27. Also see pages B26 and B28.

PEERLESS WALL RADIATORS

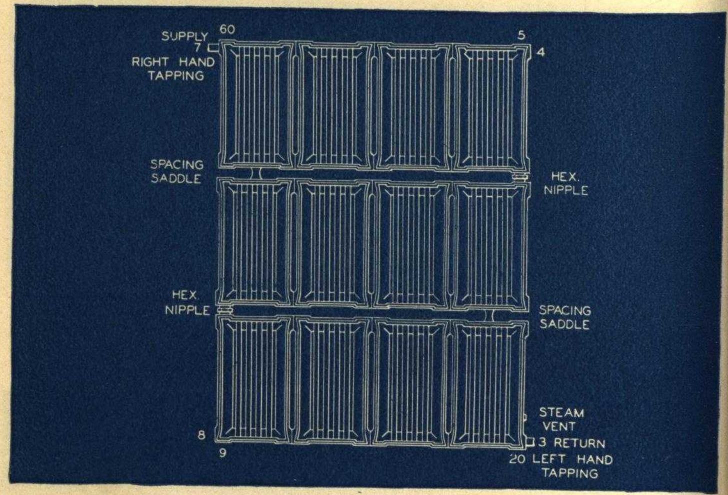
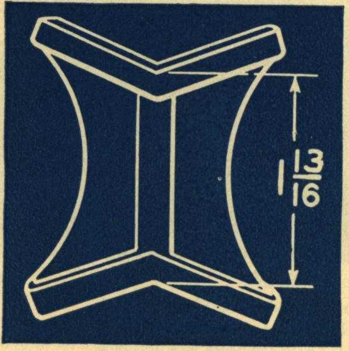


Figure 742 or 942
Assembled in Twelve Sections in Three Tiers. Using Spacing Saddles (see below)

Indicate points at which tappings are required.

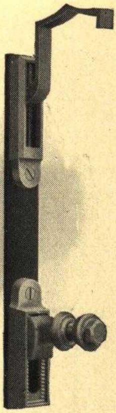
See note on Tappings, page B27. Also see pages B26 and B28.



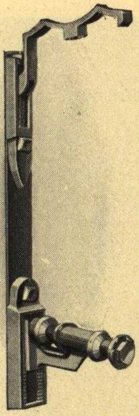
Wall Radiator Spacing Saddle

Furnished between sections in assemblages of Peerless Wall Radiators, similar to figure above. Saves using extra brackets. Furnished without charge.

ARCO ADJUSTABLE WALL BRACKETS



Single spool bracket for single row of radiation



Double spool bracket for double row of radiation

MADE for all runs of wall radiators in factories, warehouses, theatres, railroad stations and other buildings, garages, schools, churches and residences.

By use of these brackets, which permit vertical adjustment of 2 inches, the fitter can adjust for "pitch" after they have been attached to the wall. The brackets set the outer face of the radiator 4¾ inches from the wall.

The spools on the bottom bracket allow a free horizontal movement of the radiators, thus taking care of any difference in "roughing-in" measurements, and afford free-play for expansion and contraction. The V-shape formed by the divided spool fits the edges of Peerless Wall sections, thus keeping them securely in place.

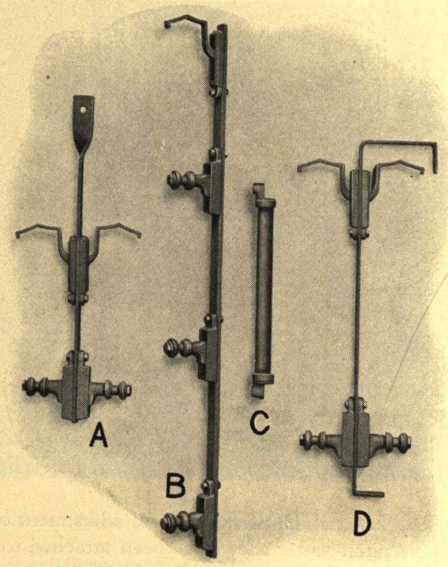
The malleable iron finger of the top bracket is set at its highest point and then screwed down to the radiator, merely guiding it and keeping it from tipping forward.

On Special Order we furnish the Arco Brackets with two spools (see above)—to carry two runs of radiation separated for "A" section about $1\frac{7}{16}$ inch, and for "B" section 1¼ inch.

For application of new Arco Adjustable Wall Brackets to Peerless Wall Radiators and for chart showing number and location of Brackets see following pages.

When ordering state whether for use with 5, 7, or 9 square foot sections and whether of "A" or "B" pattern, giving figure number of assemblage. See pages B27 to B34. See page B39 for detail measurements.

ARCO ADJUSTABLE WALL BRACKETS



Assemblages of Arco Adjustable Wall Brackets

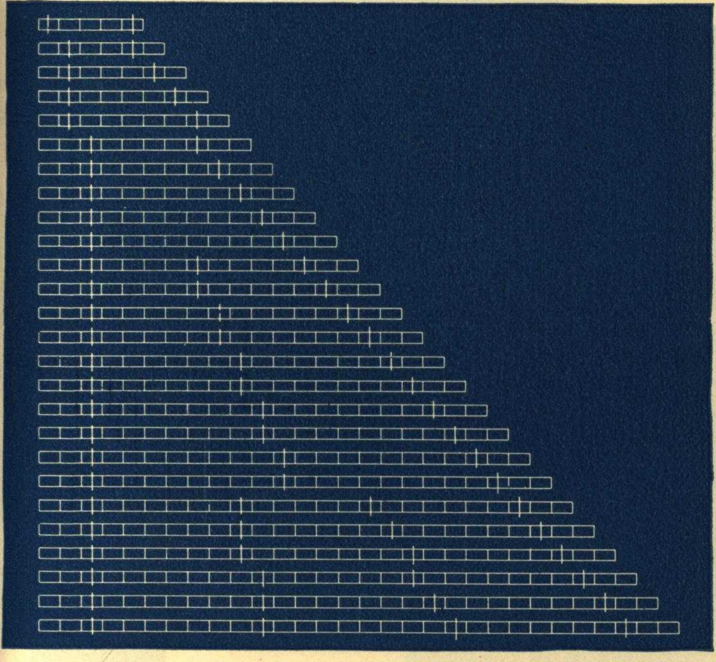
FIGURE "A" shows a combination Arco Adjustable Support suspended from the ceiling, permitting the duplex arrangement of the wall pattern radiators.

Figure "B" shows a multiple support used preferably with the "A" section, permitting a number of radiators to be supported one above another, the intermediate roll in each case serving the double purpose of carrying the weight of the section as well as guiding the top of the lower one.

Figure "C" shows a trapeze hanger which is used for supporting wall radiators which are hung flat and parallel to the ceiling. The end fittings are screwed into a 1-inch pipe or long nipple and the rods which extend at right angles pass through the fittings and permit a vertical adjustment.

Figure "D" shows a combination which may be used in place of the double spool support, the brackets being fastened to a bent bar and the latter bolted to the wall at the top and to the floor at the bottom.

ARCO ADJUSTABLE WALL BRACKETS



For Single Row

Graphic chart to show by perpendicular lines how many and where to place New Arco Adjustable Wall Brackets upon Radiators of different assemblages, from 5 to 30 sections. (See page B39.)

For Double Row of Radiation

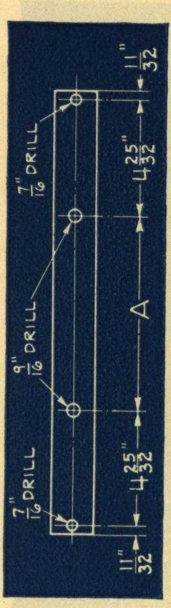
The following table gives the number of double spool Arco adjustable brackets required to support properly two rows of "B" Sections Peerless Wall Radiators:

Number of Double Sections	Number of Brackets
5 to 8	2
9 to 14	3
15 to 24	5
25 to 32	7
33 to 45	8

See Measurements of Brackets, page B39.

ARCO ADJUSTABLE WALL BRACKETS

BEARING PLATE DIMENSIONS



BEARING Plates are first fastened to the wall after which Arco Adjustable Wall Brackets are fastened to the Bearing Plates.

No. 1 Bearing Plate for 5-A, 7-A and 9-A Peerless Wall Radiators in assemblages not requiring split plates.

No. 2 Bearing Plate for 7-B Peerless Wall Radiators in assemblages not requiring split plates.

No. 3 Bearing Plate for 9-B Peerless Wall Radiators in assemblages not requiring split plates.

DIMENSION A

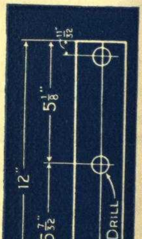
5 in. for No. 1 plate
13¾ in. for No. 2 plate
20⅞ in. for No. 3 plate

SPLIT BEARING PLATE

For 5-A, 7-A and 9-A and 7-B and 9-B Peerless Wall Radiators as used in Assemblage Figs. 515, 715, 915, 740, 940, 541, 741, 941, 742 and 942.

Note

Dimensions of Bearing Plates for double row assemblages will be supplied on application.



Split Bearing Plate
Top and bottom plates are identical

ARCO ADJUSTABLE WALL BRACKETS

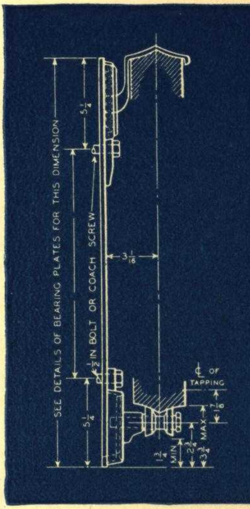

SEE DETAILS OF BEARING PLATES FOR THIS DIMENSION
5 1/4
1/2 IN BOLT OR COACH SCREW
3 1/16
℄ OF TAPPING
7/16
1 3/4
MIN
2 3/4
3 3/4
MAX
5 1/4

Fig. 1

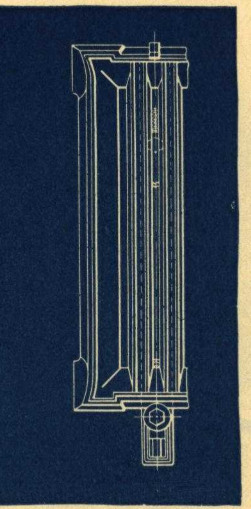


Fig. 2

Figs. 1, 2 and 3 show construction details and measurements of Arco Adjustable Wall Brackets.

Fig. 1 illustrates Bracket for a single row of Peerless Wall Radiators.

Fig. 3 illustrates Bracket for double row of Peerless Wall Radiators.

Fig. 2 illustrates appearance of either Bracket when supporting Peerless Wall Radiators.

For Bearing Plate Dimensions see page B38.

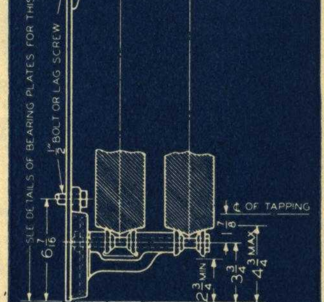
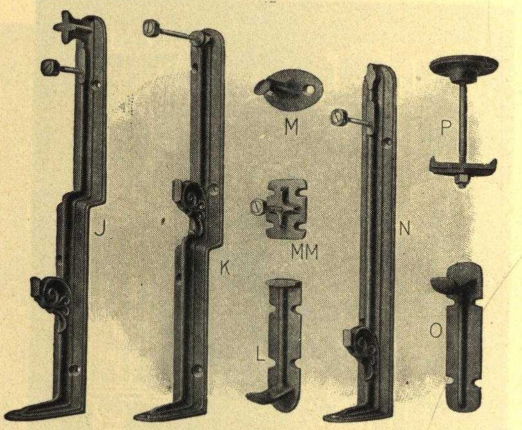


Fig. 3

ARCO WALL AND CEILING BRACKETS



Brackets "J": To fit over a 9½-inch high baseboard or skirting, and for supporting Wall Radiators Nos. 7-B and 9-B. With each "J" Bracket we furnish one ¼-inch stove bolt and one button.

Height from floor to center of lowest tapping (Supply or return):

J-1 Bracket	9½ inches
J-2 Bracket	7½ inches
J-3 Bracket	5½ inches

Brackets "K": To fit over baseboard or skirting, and for supporting Wall Radiators Nos. 5-A, 7-A, and 9-A. With each "K" Bracket we furnish one ¼-inch stove bolt and one button. Height from floor to center of lowest tapping (Supply or return):

K-1 Bracket will fit over	11½-inch	high baseboard	16 inches
K-2 Bracket " " "	9½	" " "	14 inches
K-3 Bracket " " "	7½	" " "	12 inches
K-4 Bracket " " "	5½	" " "	10 inches
K-5 Bracket " " "	3½	" " "	8 inches
K-6 Bracket " " "	1½	" " "	6 inches

Brackets "L," "O," "MM," and "M": Screwed to wall, baseboard or wainscoting. "L" and "O" Brackets are bottom supports for all sizes of Wall Radiators. "MM" and "M" Brackets are top guides to hold radiator in place. "L" and "MM" Brackets are concealed, "O" and "M" Brackets are not. One "MM" or "M" Bracket should always be provided for use with each "L" or "O" Bracket. "L," "O," and "MM" Brackets are slotted for four, and the "M" Bracket for two wood screws—not furnished by us. With each "MM" Bracket we furnish one ¼-inch stove bolt and one button.

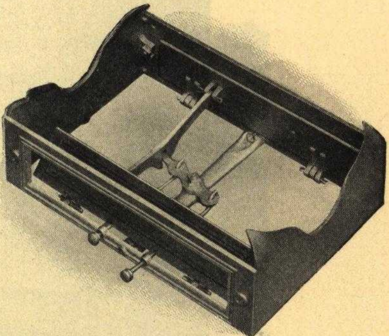
Bracket "N": Is a straight right angle Bracket, without offset, for supporting all sizes of Wall Radiators; height from floor to center of end tapping bosses, 5½ inches. With each "N" Bracket we furnish one ¼-inch stove bolt and one button.

Ceiling Bracket "P": Made of cast plate, 3½ inches diameter and screwed to ceiling joists by four screws—not furnished by us. The bolt furnished gives a distance of 3½ inches to 5 inches from bottom of Radiator to ceiling. Other length bolts can be furnished on special order.

Note.—In ordering buttons and stove bolts separately, state for which bracket, because of different lengths of bolts.

PORTABLE VENTILATING BOX-BASE

For Ventilating Radiators

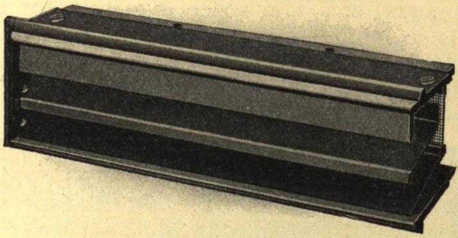


IN this interchangeable Base dampers work with reversible action. When front damper is open, back damper is closed, and vice versa. When front damper is open, air is taken from the room; when rear damper is open, air comes from outside. Furnished with either opening and damper in back or in the floor, as desired.

Front View—with Rear Wall Collar and Damper

Specify whether bases are desired with regular inlet collar in rear as above shown or for inlet to come through floor.

WALL BOXES

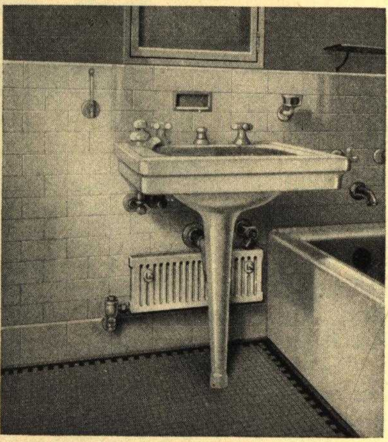


THESE are substantially constructed with heavy enamel finish and their angle slats and inside brass-wire screen render them storm and insect-proof. Made in two sizes.

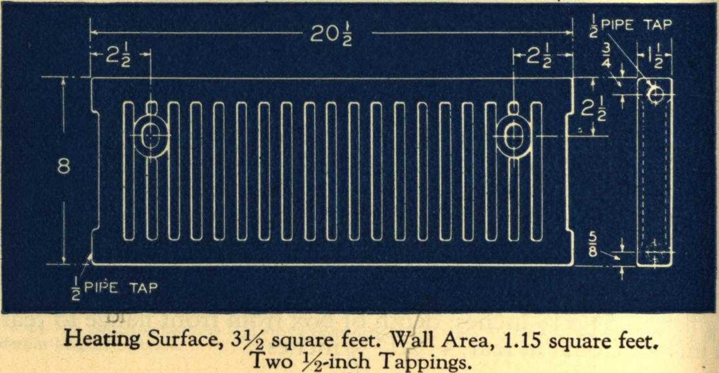
Large Box, exclusive of flange, 8x25 inches; including rib or flange, 8⅞x25½ inches; depth of box from front flange to rear, 4 inches. Collar at the rear, 7⅞x24⅝ inches.

Small Box, exclusive of flange, 5x17½ inches; including rib or flange, 5⅝x18 inches; depth of box from front flange to rear, 4 inches. Collar at rear, 4⅞x17⅛ inches.

PEERLESS BATHROOM RADIATOR

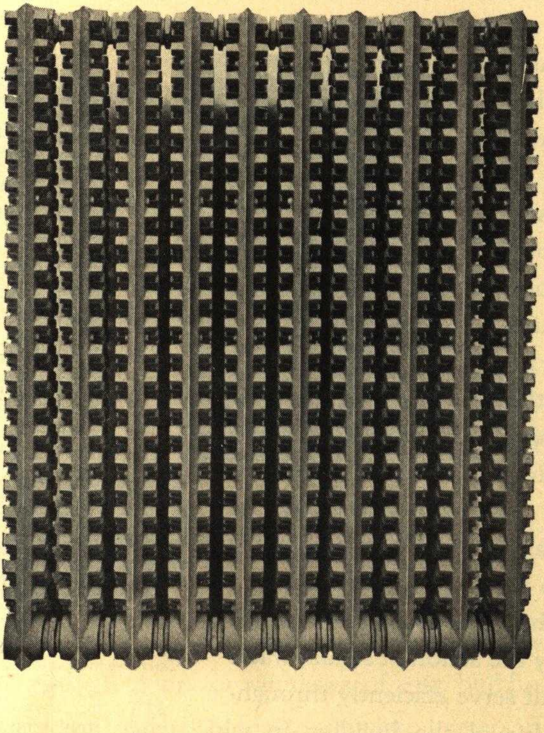


THE Peerless Bathroom Radiator is designed especially for the warming of modern bathrooms, such as are found in hotels, apartments, etc. The space available for radiation in such rooms is so limited that the Peerless Bathroom Radiator fills a long felt need. This efficient radiator is easily fastened to the wall under the wash basin by simple lag screws or hooks. When harmoniously enameled its appearance is most pleasing.



Heating Surface, 3½ square feet. Wall Area, 1.15 square feet.
Two ½-inch Tappings.

VENTO CAST IRON HEATER

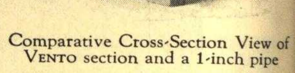


JUST as American Radiators have become the standard for direct radiator heating, so also has the Vento Cast Iron Hot Blast Heater become the standard of merit for blower and ventilation systems. For this heater is constructed according to scientific principles and the same exacting standards of manufacture that make all American Radiators and IDEAL Boilers so acceptable and popular the world over. Vento heaters are furnishing satisfactory heating and ventilating service in thousands of large and small buildings, such as schools, churches, stores, banks, hospitals, hotels, clubs, theatres, auditoriums, libraries, etc.—wherever people are accustomed to congregate in large numbers.

These heaters are unequaled in operating efficiency. Internal currents of steam or hot water carry the heat through the hollow iron heating spaces shown in the illustration, while the exterior surfaces are very carefully designed to effect the maximum rubbing contact with the air and therefore the greatest possible heat transfer per square foot of surface. The warmed air is distributed at comfortable temperatures through the building.

Vento Heaters are shipped in blocks of sections, easily handled. Sections consist of only three parts, one main casting and two hexagon nipples. They may be carried through doors, windows or ordinary openings and may be quickly assembled. A considerable saving in labor is thus effected.

And the sections do not corrode or rust by the action of steam, water or air, but serve efficiently throughout the life of the building in which they are installed. In durability, as in efficiency, Vento Cast Iron Heaters are the best investment for property owners.



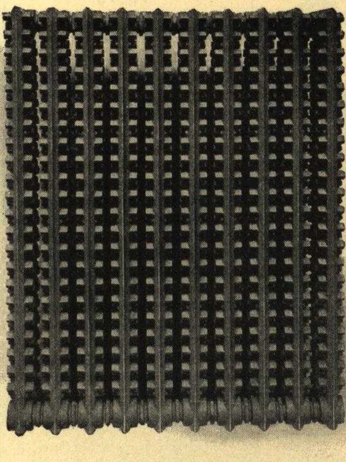
Comparative Cross-Section View of VENTO section and a 1-inch pipe

Complete physical and technical data is contained in booklet entitled "Engineers' Data on Vento Heaters."

VENTO HEATERS—CAST IRON

FOR FAN OR BLOWER WORK

Regular Section



Front View of Ten-Section Stack

Cross Section

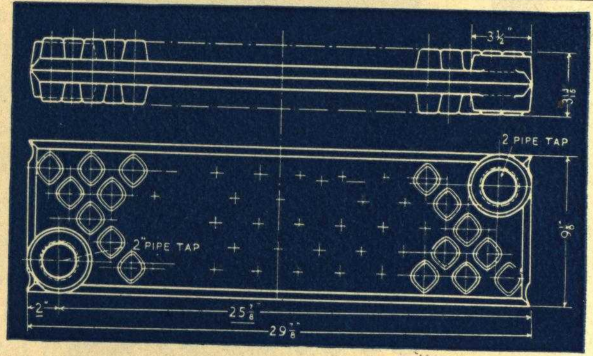
Sections are easily handled and transported and may be carried through doors or windows of any building, and can then be assembled in compact, complete heaters. The equivalent pipe coil stacks are cumbersome and difficult to handle and transport.

All details given in special catalogs.

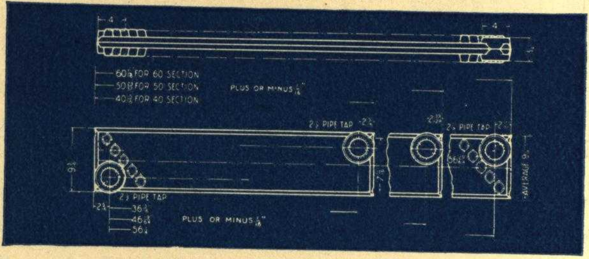
VENTO HEATERS

MEASUREMENTS

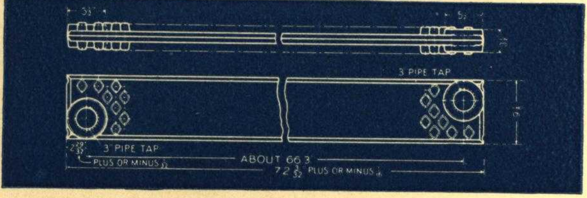
Regular Sections	Square Feet per Section	Height	Width
30 inch	8.0	30	9⅛
40 inch	10.75	41 1/64	9⅛
50 inch	13.5	50 29/32	9⅛
60 inch	16.0	60 11/16	9⅛
72 inch	19.0	72	9⅛



30-Inch Vento Section



40, 50 and 60-Inch Vento Sections

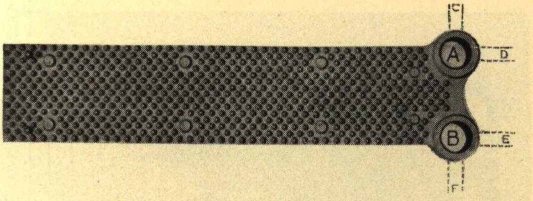


72-Inch Section

PERFECTION PIN

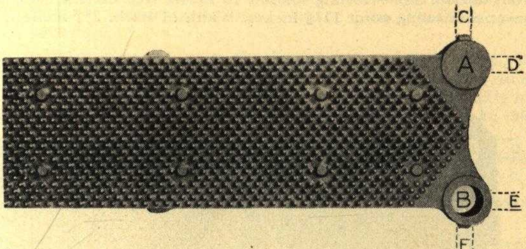
FOR STEAM AND WATER

THREADED NIPPLE CONNECTIONS



"Standard" Size, Water End Section

MEASUREMENTS: Heating surface, 10 square feet. Length, 36¼ inches. Height, 7½ inches—at connecting point $9\frac{13}{16}$ inches. Width in stack, 2¾ inches. On *Special Order* we furnish nipples to make distance center to center of sections in stack, 3, 3¼, 3½ or 3¾ inches.



"Extra Large" Size, Steam End Section

MEASUREMENTS: Heating surface, 15 square feet. Length, 36¼ inches. Height, 11½ inches—at connecting point 14 inches. Width in stack, 2⅞ inches. On *Special Order* we furnish nipples to make distance center to center of sections in stack, 3⅛, 3⅜, 3⅝, or 3⅞ inches.

BOTH SIZES

CONSTRUCTION: Both "Standard" and "Extra-Large" sections are made in distinctive patterns for Steam and Water. The Steam patterns have one connection or passageway for Steam—the Water patterns have two connections or waterways.

TAPPINGS: 2 inches right-hand on one side, left-hand on other side. Unless otherwise ordered the inside tappings in bushings will be right-hand. *Air Valve Tap*—⅜-inch.

SPECIAL TAPPINGS: If other than regular tappings ("A" and "B" for water and "B" only for steam) are desired, we can furnish on the Standard size section special tappings 1¼ inches or smaller, at "C," "F," "D," and "E," and for steam section 2 inches or smaller at "A." On the Extra Large section, can furnish special tappings 2 inches or smaller at "B," "C," "D," and "F," and at "A" on the steam section.

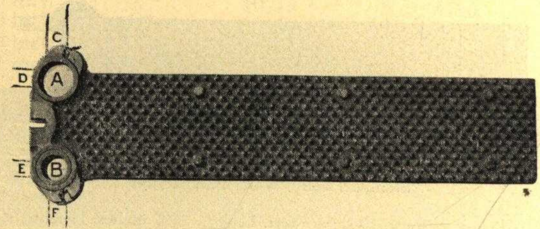
CONNECTIONS: Extra-heavy 2-inch right and left threaded nipples with hexagon nut in center.

SHIPMENTS: Water sections separate unless ordered assembled in stacks of 5 or 6 sections; steam sections cannot be safely shipped assembled and are therefore shipped knocked down. Sufficient nipples are shipped to assemble.

PERFECTION PIN

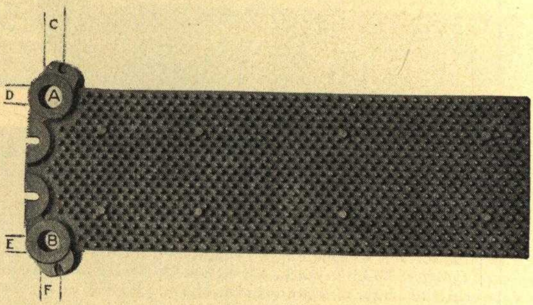
FOR STEAM OR WATER

Flange and Bolt Connections



"Standard" Size, Steam End Section

Measurements: *Standard Size*—Heating surface, 10 square feet. Length, 36¼ inches. Height, 7½ inches—at connecting point 11½ inches. Width in stack, 2¾ inches.



"Extra Large" Size, Steam End Section

Measurements: Extra Large Size—Heating surface, 15 square feet. Length, 36¼ inches. Height, 11½ inches—at connecting point, 15½ inches. Width in stack, 2⅜ inches.

BOTH SIZES

Construction: Made in one type for either steam or water—with openings at both top and bottom.

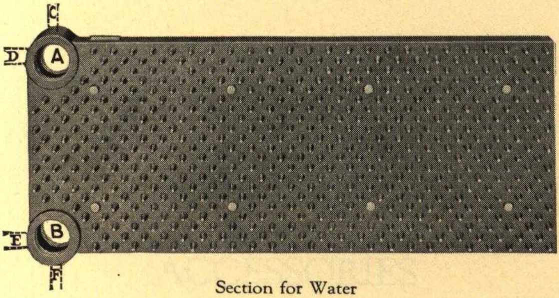
Tappings: 2 inches, right-hand threads, unless otherwise ordered. *Air Valve Tap*—⅜-inch.

Special Tappings: If other than regular tappings ("A" and "B" on water, and "B" only steam) are desired, we can furnish special tappings, 1¼ inches or smaller at "C," or "F," "D," and "E," and for steam 2 inches or smaller at "A."

Shipments: Always separately; cannot be shipped assembled. Sufficient bolts are sent to assemble.

SANITARY SCHOOL PIN

FOR STEAM AND WATER



Section for Water

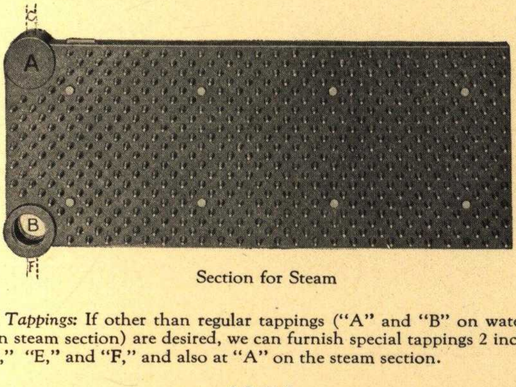
Construction: These sections are made in distinctive patterns for Steam and Water. The Steam patterns have one connection or passageway for steam. The Water pattern has two connections or waterways.

Measurements: Heating surface, 20 square feet. Length with regular tappings, 36⅛ inches—when tapping is at "D" or "E," 36⅜ inches. Height, 13⅞ inches; height at connecting point with regular tappings, 15¼ inches—with special tappings at "C" or "F," 15½ inches. Width—each section in stack, 4 inches. On *Special Order*, we furnish nipples to make distances center to center in stack 3¾, 4¼, or 4½ inches.

Tappings: 2 inches, right-hand on supply end; left-hand on return end. Unless otherwise ordered the inside tappings of bushings will be right-hand. *Air Valve Tap*—⅜-inch.

Connections: Extra-heavy 2-inch right and left threaded nipples with hexagon nut at center.

Shipments: Steam sections always separate; Water sections separate, but when so specified Water sections can be shipped in five or six section stacks. Sufficient nipples are sent to assemble.

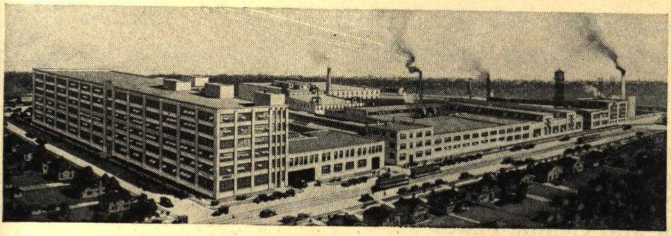


Section for Steam

Note, *Special Tappings:* If other than regular tappings ("A" and "B" on water section and "B" only on steam section) are desired, we can furnish special tappings 2 inches or smaller at "C," "D," "E," and "F," and also at "A" on the steam section.

IDEAL-ARCO
ACCESSORIES

IDEAL-ARCO ACCESSORIES



Detroit Lubricator Plant of the American Radiator Company where IDEAL-ARCO Specialties are made

THE success of the heating plant is to a great measure dependent upon accessories. The best heating plant is a unit—an assemblage of coordinated parts all working together for the success of the whole, and the failure of any one part means decreased efficiency.

The great plant pictured above is the result of this company's early realization of the need for better accessories. The line of products shown on the following pages have been developed in the Accessories Division Laboratories of this plant, which has for over 50 years maintained a world-wide reputation for precision and quality production. Each accessory carrying our name is backed by the long experience of a corps of highly trained engineers and skilled workmen.

This complete line of valves, vents and regulators will improve the performance of any heating plant—old or new. And in combination with American Boilers and Radiators offers our trade and through them the public a heating plant with only one undivided responsibility—backed by our guarantee.

ARCO ACCESSORIES

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RADIATOR VALVES

ALL radiator valves described in the following pages are manufactured complete at Detroit Lubricator Plant of American Radiator Company, the largest producer of radiator valves in the world. Years of experience, with continued research for improvements, have developed a line of valves complete for all heating needs. Genuine Detroit valves stand for quality and dependability to discriminating heating contractors, engineers and architects the country over, and are noted for their symmetry, smooth castings and fine finish. Thorough tests and rigid inspections insure that every valve shipped is a perfect valve, so there are no delays or disappointments at the job.

PACKLESS RADIATOR VALVES

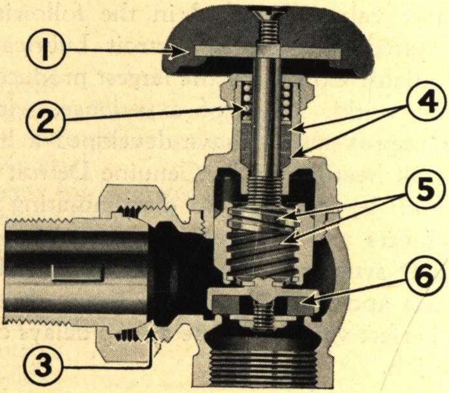
Because of their many advantages, packless valves are rapidly supplanting packed valves on smaller residence work as well as larger apartment and office buildings. The more progressive heating contractors, architects, and owners have discovered from experience that the small difference in cost is more than offset by the added value of the packless type valve.

Arco Packless Radiator Valves, the achievement of fifty years of high grade valve manufacturing, faithfully fulfil every valve requirement. They afford absolute protection against leaks that often cause costly damage to radiator surroundings. Their advanced packless construction eliminates all need for repacking. They are smart in appearance and design. Throughout their entire long life their operation is perfect—opening and closing with one smooth turn of a handle that never gets too hot.

Since they are leak-proof they are especially well-fitted for vapor or vacuum work. When Arco Packless Valves are used there is no chance for air leakage into the system.

Arco Packless Valves are made for all types of heating.

No. 999 ARCO PACKLESS RADIATOR VALVES



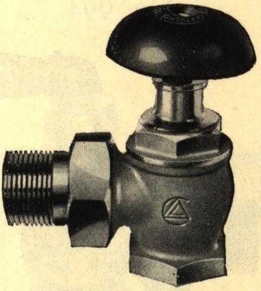
STOCK NO. 999

For Steam, Vacuum, Vapor and Forced Hot Water Heating

1. Non-breakable handle of heat resisting composition insures comfortable grip. Has integral metal reinforcement which does not work loose. One smooth, easy turn opens and closes the valve.
2. Heavy non-rusting spring, located outside the steam chamber, keeps constant pressure on special leak-proof rings.
3. Long tapered joints permit easy make-up in spite of any slight variations in piping.
4. "Leak-proof" feature—special molded rings with metal core held under compression by heavy spring maintain a tight seal around the stem indefinitely.
5. Sturdy thread screw of large diameter insures easy, smooth operation and tight seating. Will not "unwind" when closed.
6. Composition disc of highest quality.

Arco Packless, a sturdy, dependable, good looking, long-lasting, all purpose radiator valve, moderate in price.

No. 999 ARCO PACKLESS RADIATOR VALVES



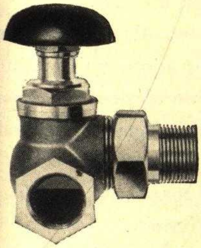
No. 999 Angle

In satin-nickel finish, polished trimmings. All threads right hand. With union. Composition disc.

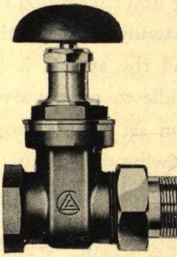
Lock and shield, page C12. Extension stems, page C13.

Lever handles furnished at a slight additional cost.

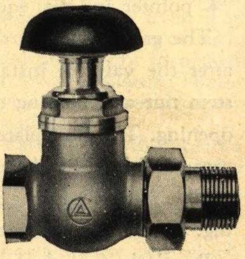
Roughing-in measurements, page C14.



No. 943
Right-Hand Corner



No. 993
Gate with Union



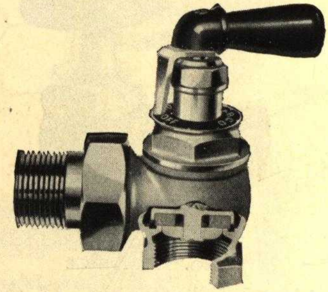
No. 949
Globe

LIST PRICES

No.	Type	½ inch	¾ inch	1 inch	1¼ inch	1½ inch
999	Angle	$3.70	$4.30	$5.10	$6.40	$8.40
945	R.H. Offset corner	4.10	4.75	5.60	7.05	9.25
941	L.H. Offset corner	4.10	4.75	5.60	7.05	9.25
953	R.H. True corner	....	4.75	5.60	....	....
954	L.H. True corner	....	4.75	5.60	....	....
993	Gate	3.65	4.25	5.20	6.60	9.00
993	L. & S. Gate, add to list	.65	.70	.85	1.00	1.20
949	Globe	3.70	4.30	5.10	6.40	8.40

ARCO PACKLESS FRACTIONAL VALVES

No. 994



No. 994 Fractional

For Vapor and Vapor-Vacuum Heating

THE fractional type Arco Packless is exactly the same as the 999 with pointer and dial equipment and calibrating cone on the disc.

The graduation for the maximum port opening is readily accomplished after the valve is installed and the system is in operation, by loosening stem nut and moving the handle to open valve to the desired maximum opening. The dial plate is then set so that stop post is against the indicator and held in place by screwing down nut.

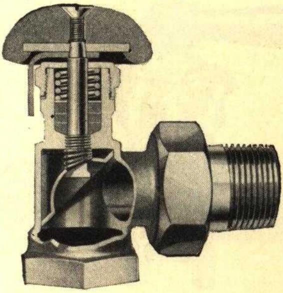
This setting makes a permanent adjustment for the maximum port opening. Intermediate control is provided by means of the handle.

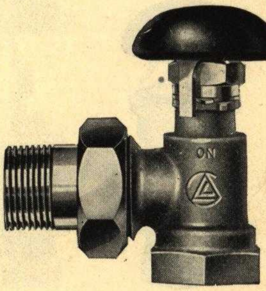
Regularly furnished with lever handle. Round handle can be supplied (No. 995). Can be furnished with Lock and Shield, page C12. With union, angle pattern, Satin Nickel Finish Polished Trimmings. For roughing-in dimensions see page C14. Extension Stems, page C13.

LIST PRICES

No.	½ inch	¾ inch	1 inch	1¼ inch
Angle, 994 Lever Handle, 995 Round Handle.	$3.70	$4.30	$5.10	$6.40
Offset Corner:				
R. H. 942 Lever Handle, 943 Round Handle L.H. 938 Lever Handle, 939 Round Handle	4.10	4.75	5.60	7.05

No. 901 ARCO PACKLESS HOT WATER VALVES





No. 901
Patent No. 1459809

A PACKLESS Hot Water Valve combining three distinctive features—the swinging plate of the well-known No. 101 Detroit Hot Water Valve (see page C10), the non-leaking packless feature of the No. 999 Arco Packless Valve (see page C4) and an adjustable stop for equalizing water flow.

Distribution of hot water throughout a heating system is determined by the size, change of direction and pitch of pipe; by the length of branches, height of radiator above the boiler, and a number of other variables. Even if it were possible to definitely figure the influence on the circulation of each of these and to accurately compute areas, commercial pipe is not furnished in enough sizes to provide a uniform flow through every radiator. Therefore, to secure the best results it is necessary to provide a mechanical means by which the heating contractor can *balance* the circulation.

The equalizing features of the 901 Arco Packless Valve permit the area of the opening through the valve to be adjusted *after installation* to meet the requirements of each individual radiator. The adjustment is made by loosening the stem cap and turning the stop so that the valve can be opened only to the desired amount for those radiators having too free a circulation.

These valves have the famous swinging plate (shown in the cut) which has contact only on its narrow edge. This, acting as a scraper, cuts away all corrosion and deposit preventing sticking so common with all valves of the shell type. In the open position the concave plate, set at a 45 degree angle, reduces friction (like an elbow) and insures full circulation. Indicator shows whether valve is open or closed.

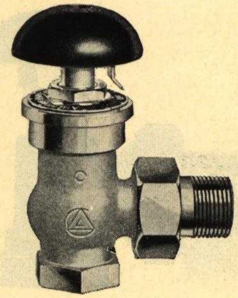
Composition, cool grip non-breaking handles. Can be furnished with lock and shield. See page C12. Extension Stems, page C13.

With union, angle pattern, satin nickel finish, polished trimmings. For roughing-in dimensions, see page A14. (For forced water jobs use No. 999.)

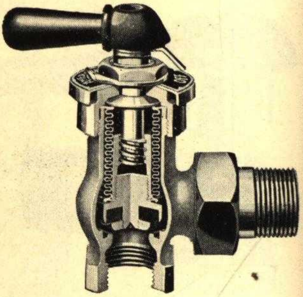
LIST PRICES

Size	½ inch	¾ inch	1 inch	1¼ inch	1½ inch
No. 901 Round Handle No. 904 Lever Handle	$3.25	$3.70	$4.50	$5.75	$7.30

IDEAL BELLOWS PACKLESS VALVES



No. 888 Round Handle



No. 868 Lever Handle

For Two-pipe Vapor or Steam Heating

IDEAL Packless Valves employ a seamless all metal bellows to form an air- steam- and water-tight seal around the stem. One smooth turn of the handle opens or closes the valve. This type is designed for two pipe steam, vapor or vacuum jobs only and is regularly furnished with etched dial, indicator, and handle, round or lever, as ordered.

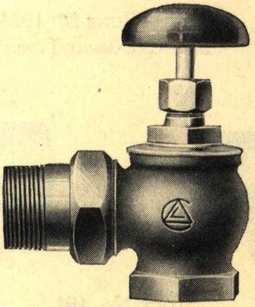
When fractional control is desired the graduated types as No. 868, etc., equipped with calibrating cone on the disc to provide accurate control of vapor flow, should be specified. These valves have an adjustment feature by means of which the maximum port opening may be set permanently after the system is in operation. This is accomplished by loosening the stem nut and setting the stop so that it will limit the turn of the handle at the desired opening. Tightening the nut then gives permanent setting to meet the maximum requirements of the individual radiator.

Satin nickel finish, polished trimmings. Threaded right hand, both openings. Made in Angle, Corner and Globe Patterns with union. Furnished with Lock and Shield. Page C12. Roughing-in dimensions, see page C14. Extension stems, page C13.

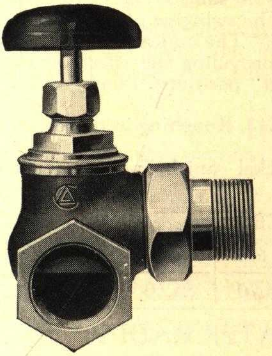
LIST PRICES

Stock	Kind	½ inch	¾ inch	1 inch	1¼ inch
No. 888	Angle, Round Handle..........	$5.50	$5.50	$6.75	$7.75
No. 878	Angle, Lever Handle...........	5.50	5.50	6.75	7.75
No. 872	Angle, Round Handle, Graduated	5.50	5.50	6.75	7.75
No. 868	Angle, Lever Handle, Graduated.	5.50	5.50	6.75	7.75
No. 871	Globe, Round Handle..	5.50	5.50	6.75	7.75
No. 870	Globe, Lever Handle..	5.50	5.50	6.75	7.75
No. 889	R. H. Corner, Round Handle...	6.00	6.00	7.25	8.50
No. 879	R. H. Corner, Lever Handle....	6.00	6.00	7.25	8.50
No. 890	L. H. Corner, Round Handle...	6.00	6.00	7.25	8.50
No. 880	L. H. Corner, Lever Handle....	6.00	6.00	7.25	8.50

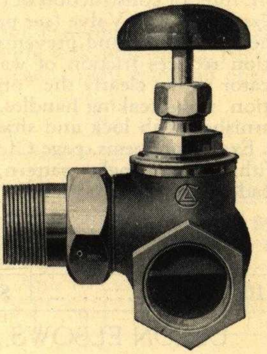
DETROIT STEAM RADIATOR VALVES



Angle No. 72 with Union



No. 32—Right-Hand Corner



No. 37—Left-Hand Corner

These steam valves—both angle and corner—are machined carefully and subjected to rigid inspection. The metal is well distributed; threads carefully cut.

Equipped with non-breaking composition cool grip handle.

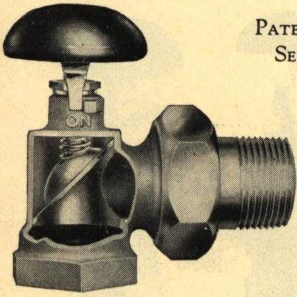
Satin-nickel finish, polished trimmings plated all over. Threaded right hand. All valves can be furnished with lock and shield. Roughing-in dimensions see page C14. Lock and shield, page C12. Extension stems, page C13.

LIST PRICES

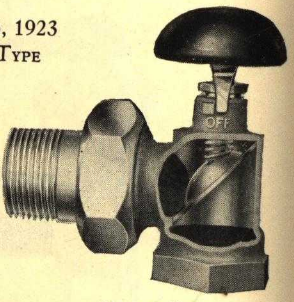
Stock No.	Size	½ inch	¾ inch	1 inch	1¼ inch	1½ inch
72	Comp. Disc Angle	$3.70	$4.30	$5.10	$6.40	$8.40
32	Comp. Disc. R. H. Cor.	4.10	4.75	5.60	7.05	9.25
37	Comp. Disc. L. H. Cor.					

DETROIT WATER RADIATOR VALVES

Patented June 26, 1923
Self Cleaning Type



Valve Open



Valve Closed

Stock No. 101

THE interior construction of this valve is the same as that of the Arco Packless Hot Water Valve (see page C7). The swinging plate keeps the inside of the valve clean and prevents "sticking." The concave plate in the open position reduces friction of water flow, providing the effect of an elbow. Indicator shows clearly the "on" and "off" positions. Equipped with composition, non-breaking handles.

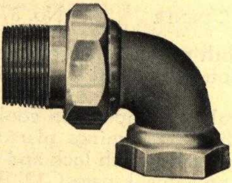
Furnished with lock and shield, page C12. Roughing-in dimensions, page C14. Extension stems, page C13.

With union, angle pattern, satin-nickel finish, polished trimmings. Threaded right-hand both openings.

LIST PRICES

Size	½ inch	¾ inch	1 inch	1¼ inch	1½ inch
No. 101	$3.25	$3.70	$4.50	$5.75	$7.30

UNION ELBOWS FOR WATER RADIATORS



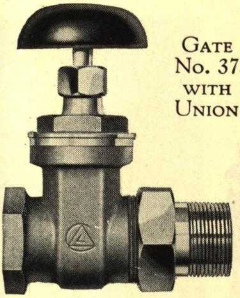
No. 132
Both Threads Right-Hand

Satin-nickel finish, polished trimmings. Roughing-in dimensions, see page C14.

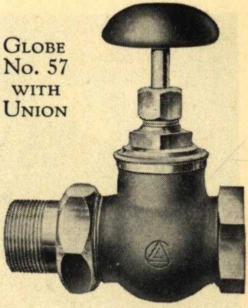
LIST PRICES

Size	½ inch	¾ inch	1 inch	1¼ inch	1½ inch
No. 132	$1.75	$2.00	$2.50	$3.30	$4.25

STRAIGHTWAY RADIATOR VALVES



Gate
No. 373
with
Union



Globe
No. 57
with
Union

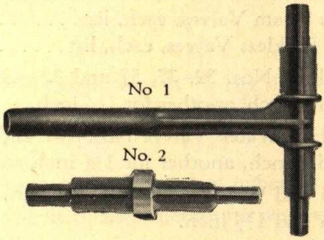
Gate valve has double gate with non-rising stem. Globe valve has composition disc.

Both valves equipped with composition, non-breaking handles. Roughing-in dimensions, see page C14. Furnished with lock and shield, page C12. Satin-nickel finish, polished trimmings. Threaded right hand all openings. Extension stems, page C13.

LIST PRICES

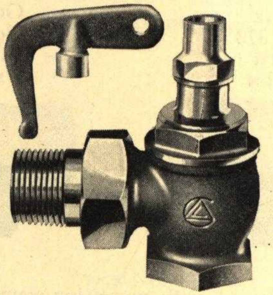
Size	½ inch	¾ inch	1 inch	1¼ inch	1½ inch
No. 373 Gate	$3.65	$4.25	$5.20	$6.60	$9.00
No. 57 Globe	3.70	4.30	5.10	6.40	8.40
Extra for Lock and Shield No. 373. Add to List on Valves					
For L & S	.65	.70	.85	1.00	1.20

IDEAL SPUD WRENCHES



For connecting tail pipes of union radiator valves. Made of malleable iron. Either style embraces 1½, 1¼, 1, and ¾ inch sizes. List prices each, Style 1, No. 590, $0.75. Style 2, No. 591, $0.50.

LOCK AND SHIELD RADIATOR VALVES



STOCK NO. 999—WITH LOCK AND SHIELD

ALL styles of Radiator Valves can be furnished, on special order only, with Lock and Shield. When ordering specify quantity, stock number and size of Valve adding the words "Lock and Shield." See special list for Nos. 373 and 993 Gate Valves, Pages C11 and C5.

Keys not furnished unless ordered extra.

Keys for Detroit Steam Valves, Nos. 32, 37, 57, 72 and Nos. 373, 993. Gate, each, list	$0.50
Keys for Detroit Hot Water Valves, No. 101 and Arco Packless Hot Water Valves, No. 901, each, list	1.50
Keys for Arco Packless Steam Valves, each, list	.65
Keys for Bellows Type Packless Valves, each, list	.65

All Detroit Steam Valves, Nos. 32, 37, 57 and 72—One Key for ½ inch, ¾ inch, 1 inch and 1¼ inch, another for 1½ inch.

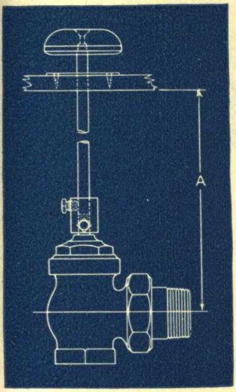
Detroit and Packless Hot Water Valves Nos. 101 and 901—One Key for ½ inch, ¾ inch and 1 inch, another for 1¼ inch and 1½ inch.

Gate Valves, Nos. 373 and 993—One Key for ½ inch, ¾ inch and 1 inch, another for 1¼ inch and 1½ inch.

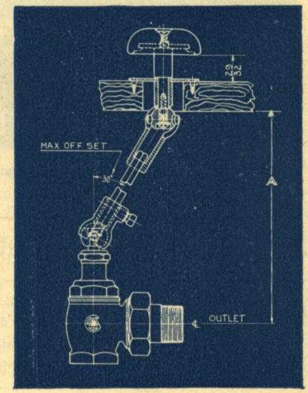
Arco Packless Steam Valves—One Key for ½ inch, ¾ inch and 1 inch, and another for 1¼ inch and 1½ inch.

Bellows Type Packless Valves—One Key for all sizes.

EXTENSION STEMS FOR RADIATOR VALVES



Stock No. 201
Straight Type



Stock No. 202
Offset Type

Extension stems can be furnished for all sizes of radiator valves—Packed and Packless. Handles supplied with valves can be attached to extension stems.

Extension stems are made in one, two, three and four foot lengths and can be cut on the job to exact lengths needed.

Extension Stems Stock No. 201 cannot be provided when dimension "A" is less than the following:

Valve Size.........	½"	¾"	1"	1¼"	1½"
A..................	4⅝"	4¾"	4⅞"	5⅜"	5½"

or, Stock No. 202, when dimension "A" is less than the following:

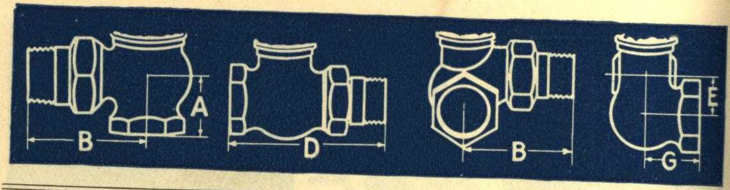
Valve Size	½"	¾"	1"	1¼"	1½"	2"
A........	6¼"	6⅜"	6½"	⅞"	7¼"	8⅞"

When ordering specify size and stock number of valves on which the extension stems are to be used, also whether for woodwork or metal grille and the length of stem desired.

PRICES ON APPLICATION

MEASUREMENTS OF VALVES AND ELBOWS

For Roughing-in Work



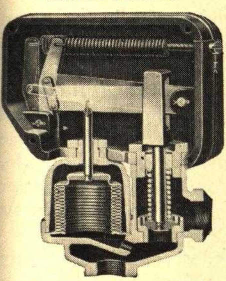
Size		½ in.	¾ in.	1 in.	1¼ in.	1½ in.
Nos. 72-101-901-904 Angle Valves	A B	1 2 5/16	1 1/4 2 5/8	1 3/8 3	1 5/8 3 3/8	1 13/16 3 5/8
No. 132 Elbows	A B	1 11/32 2 3/8	1 1/2 2 21/32	1 11/16 3 1/32	1 15/16 3 7/16	2 5/16 3 29/32
No. 57 Globe Valves	D	3 9/16	3 15/16	4 11/16	5 5/16	5 3/4
Nos. 373 and 993 Gate Valves	D	3 19/32	3 31/32	4 7/16	4 27/32	5 1/8
Nos. 32 and 37 Corner Valves	E F G	1 5/16 2 9/16 41/64	1 7/16 2 27/32 25/32	1 11/16 3 5/32 25/32	1 7/8 3 9/16 15/16	2 3/16 3 7/8 1 1/8
Nos. 888, 878, 868 and 872 Angle Packless Valves	A B	1 1/4 2 7/16	1 1/4 2 5/8	1 3/8 3	1 5/8 3 3/8	
Nos. 889, 879, 890, 880 Corner Packless Valves	E F G	1 7/16 2 11/16 25/32	1 7/16 2 27/32 25/32	1 11/16 3 5/32 25/32	1 7/8 3 9/16 15/16	
Nos. 871 and 870 Globe Packless Valves	D	3 15/16	3 15/16	4 11/16	5 5/16	5 3/4
Nos. 953 and 954 Arco True Corner Packless Valves	E F		1 7/16 2 7/8	1 11/16 3 3/16		
Ncs. 869 and 876 Arco Packless Globe Valves	D	3 15/16	3 15/16	4 19/32	5 5/16	
Nos. 994, 995, 999 Arco Packless Angle Valves	A B	1 1/32 2 1/4	1 7/32 2 3/4	1 3/8 3	1 17/32 3 1/2	1 13/16 3 3/4
Nos. 938, 939, 941, 942, 943, 945 Arco Packless Corner Valves	E F G	1 5/16 2 9/16 41/64	1 7/16 2 27/32 25/32	1 11/16 3 5/32 25/32	1 7/8 3 9/16 15/16	2 3/16 3 7/8 1 1/8
No. 949 Arco Packless Globe Valve	D	3 9/16	3 15/16	4 11/16	5 5/16	5 3/4

ARCO SAFETY AND RELIEF VALVES

ARCO COMPOUND RELIEF VALVE

For Relieving Water Pressure

Stock No. 984
Patent Pending



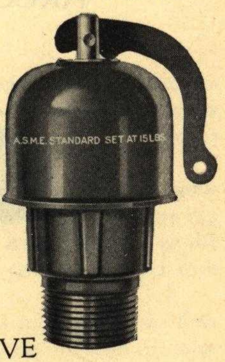
A POSITIVE relief valve for hot water heating boilers and hot water supply systems. This new design develops a reserve power, compounded by bellows and levers, sufficient to break any corrosion which may form at the valve seat. Due to the "snap action" of the levers, this reserve power operates with a "blow." Valve automatically re-sets as pressure decreases. Malleable iron body, steel levers. The valve proper has brass trimmings with bronze spring. Relieving pressures regularly furnished:—Primary 30 pounds, emergency 40 pounds, for heating boiler. Primary 75 pounds, emergency 100 pounds, for hot water supply. Other relieving pressures furnished on special order. Height, 10½ inches; width, 9¼ inches; Weight boxed 16 pounds.

No. 984, Size 1 inch, List Price $40.00

ARCO POP SAFETY VALVE

Low Pressure, Black Enamel Finish

Stock No. 420



THE Arco Pop is thoroughly dependable because its precision construction makes it exact. It releases with a distinct warning pop at the set pressure, and reseats at a slightly lower pressure, thus affording relief without needless waste of steam. The swivel operating lever swings to any convenient position. The extra long base elevates the discharge and clears the boiler covering. These valves are especially designed for low pressure heating boilers and are strictly in accordance with the A.S.M.E. Code, which requires that valve be set at 15 pounds or under and permanently sealed. Valves are regularly set at 15 pounds. No extra charge for setting at 10 pounds, factory shipment only. Special settings, less than 15 pounds, at extra charge.

VAPOR POP SAFETY VALVE

For Vapor Heating. Stock No. 421

Can be set to relieve at 1½ pounds or 3 pounds. Order should specify desired relieving pressure.

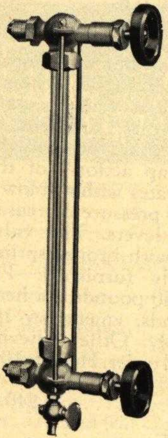
LIST PRICES

Size	¾ in.	1 in.	1¼ in.	1½ in.	2 in.	2½ in.	3 in.	3½ in.	4 in.
Price.....	5.25	6.00	6.75	8.25	11.25	26.00	37.50	50.00	80.00

ARCO PACKLESS WATER GAUGE

Self Cleaning

No. 351



No. 351

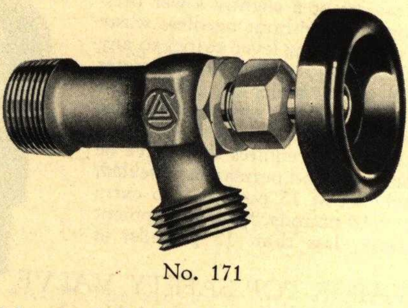
A WATER gauge designed especially for use on vacuum jobs. Air leakage into a vacuum system prevents its proper operation. One of the sources of air leakage has been through the packing of the water gauge valves. The Arco Packless Water Gauge is equipped with packless gauge valves designed on the same principle as the No. 999 Arco Packless Radiator Valves. The water gauge valves are tight against steam, water or air leaks.

Rough body brass finish, steel handles, ebony finish, ½ inch thread on valves. Glass ⅝ inch diameter. Length regularly furnished, 12 inches.

Stock No. 351. List Price, $6.50. Shipping weight, 3 pounds.

ARCO BOILER DRAIN VALVE

No. 171

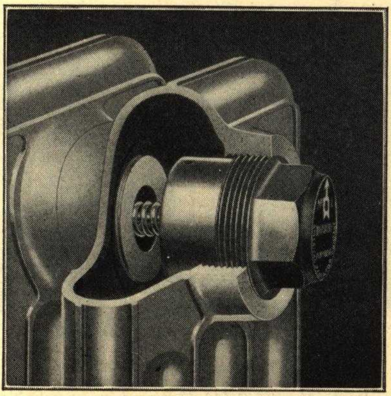


No. 171

ORDINARY Valves or Cocks should never be used as boiler drain valves. The Arco Boiler Drain Valve is especially designed for this particular purpose and is thoroughly dependable. It is sturdily built of solid brass and has a long shank to extend through the boiler covering or jacket. Regularly finished with durable steel handle, ebony finish. Boiler connection ¾ inch I.P.S., ¾ inch hose thread. Rough body, brass finish.

List Price $1.75

NO. 1 IN-AIRID AIR VALVE



No. 1 In-Airid
The Invisible Air Valve
Patent No. 1,214,443. Other patents pending

WHEN new type radiation is used on one pipe steam jobs, the steam has a tendency to short circuit through the top nipples and close the air valve before all the air has been vented. This trapped air greatly reduces the heat output of the radiator.

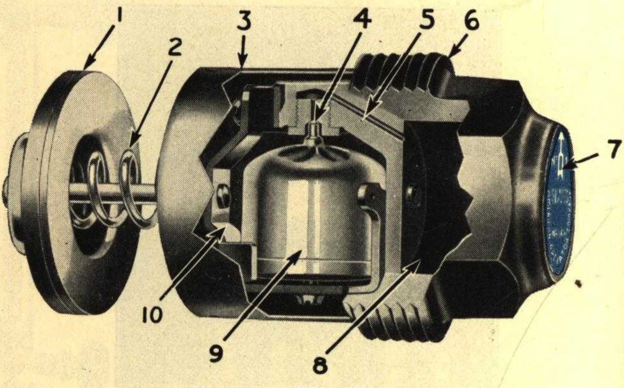
The new In-Airid prevents short circuiting and assures complete radiator venting because it is designed with a baffle disc that fits tightly into the top nipple connection of the last section. This forces the steam to travel *up* the last section (driving all the air ahead) before it can come in contact with the valve and close it.

The operation of the In-Airid is based on the same principle of the famous Airid Air Valve No. 500 (see page C21). Air passes out through the large venting channel until steam reaches the float. Then the volatile liquid within the float expands the diaphragm at the bottom and closes the port.

Of equal importance to the improved venting of the In-Airid is its highly desirable feature of invisibility. This appeals to all owners and architects, for the concealment of the air valve greatly enhances the appearance of the radiator.

See following pages for further descriptions, including data and prices.

NO. 1 IN-AIRID AIR VALVE



Patent No. 1,214,443. Other patents pending

Sectional View No. 1 In-Airid Air Valve

1. Nipple-baffle and special steam-resisting washer—insures positive blocking off of last section.
2. Rust-proof spring allows for variations in design, threads and castings of sections.
3. Shield (cut away in illustration)—protects working parts.
4. Valve pin and seat of non-corrosive metal burnished together to insure tight joint. Large opening allows rapid venting.
5. Large venting channel—assures free escape of air.
6. Brass plug 1½ inch thread I.P.S.—permits making up tight in correct position with arrow pointing upwards.
7. Air outlet in name plate prevents meddlers from damaging valve.
8. Muffling chamber—insures quiet operation.
9. Thermostatic float—closes instantly against steam or water.
10. Free area around float—nothing to hold dirt.

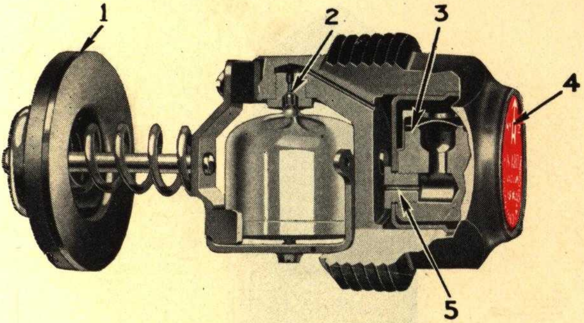
(The Invisible Air Valve)

All metal non-adjustable, easy to install. Fits all new type radiation with nipple connection at top or any old style water radiation having 1½ inch nipples and 2½ inch centers between sections.

Stock No. 1, List Price, $1.85 each. Shipping weight, per dozen, 8 pounds.

Packed in individual boxes, one dozen to a carton. ⅛ inch Radiator plug included with each valve.

NO. 2 IN-AIRID AIR VALVE



Patent No. 1,214,443. Other patents pending

Sectional View—Shield Removed

NO. 2 IN-AIRID AIR VALVE FOR VACUUM

THE In-Airid No. 2 is for "below atmosphere" jobs. It permits the air to escape but prevents its return into the system. The No. 2 has all the venting features of the No. 1, plus the vacuum seal with hand-lapped Monel disc and seat. This valve vents with only a slight boiler pressure. But, as the steam goes down, the air seal closes tightly, creating a partial vacuum in the system and retaining heat for hours after the fire is banked.

1. Nipple-baffle, the same as with the No. 1 In-Airid Valve.
2. Main valve seat opening closed against steam or water escape by means of float, as with the No. 1 In-Airid Valve.
3. Monel disc. Raised from seat under slight pressure to allow air to escape but closed down tight when pressure falls to atmosphere or below.
4. Air outlet in name plate as with No. 1 In-Airid Valve.
5. Opening for air passage into the vacuum seal.

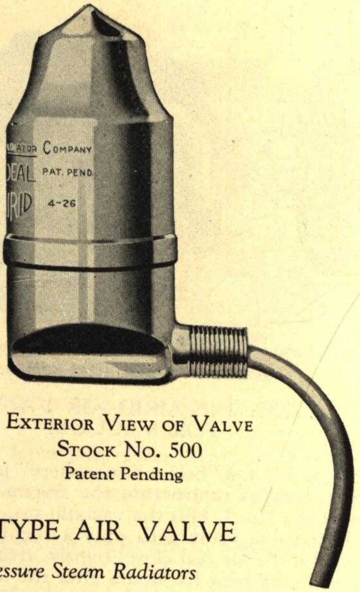
Fits all new type radiation with nipple connections at top or any old style water radiation having 1½ inch nipples and 2½ inch centers between sections.

Stock No. 2. List price, $3.00 each. Shipping weight, per dozen, 10 lbs. Packed in individual boxes, one dozen to a carton. ⅛ inch Radiator plug included with each valve.

For the most satisfactory results and fuel economy, below atmosphere steam heating plants should have the following Accessories:

Each radiator should be fitted with a No. 2 In-Airid Vacuum Valve and an Arco Packless Supply Valve No. 999 (see page C5). Ideal Vac-Vents, No. 822 (see page C27) should be installed on the mains. Boiler should have an Arco Packless Water Gauge No. 351 (see page C16). System should be made air tight throughout.

IDEAL AIRID SIPHON VALVE



EXTERIOR VIEW OF VALVE
STOCK NO. 500
Patent Pending

AN EXTERIOR TYPE AIR VALVE

For Venting Low Pressure Steam Radiators

THE No. 500 Airid Air Valve is designed particularly for the old type steam radiation with nipple connections only at the bottom, but is still the best *exterior type* air valve for all steam radiation. The outstanding success of this valve—the result of long years of heating experience—has made possible the Invisible In-Airid Valve (see page C17) for use on the new type radiation. No. 500 Airid Air Valve should be used for all replacement work (see description of Display Box, page C24) and for installation on new type radiation where exterior type air valves are desired. The great demand for this valve has warranted costly labor saving machinery which has made possible a low price.

The No. 500 Airid is rapid and quiet in operation and is guaranteed not to become noisy with use. It does not hiss, sputter or leak. The siphon quickly frees the valve of water so that even a flooded radiator is successfully vented. Airid is made entirely of metal, symmetrical and pleasing in design, highly nickeled and polished. It is non-adjustable and cannot be tampered with. Guaranteed for five years.

Regularly packed in attractive Display Boxes—12 to a box. Weight of box of twelve, 4 pounds.

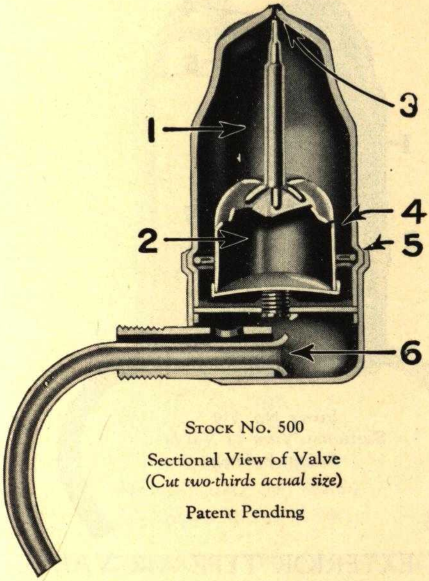
Stock No. 500 Angle connection—⅛ inch, each, $1.35.

Stock No. 502 Straight shank—⅛ inch each, $2.00.

Stock No. 501 Government Holder attachment for Airid Valves to prevent removal, each $0.75.

See next page for sectional view of No. 500 Airid Valve and description of operation.

IDEAL AIRID SIPHON VALVE



Stock No. 500

Sectional View of Valve
(*Cut two-thirds actual size*)

Patent Pending

AN EXTERIOR TYPE AIR VALVE

For Venting Low Pressure Steam Radiators

1. Large separating chamber. Ample space for air and water to separate, insuring that only air will pass out the opening.

2. Float contains volatile liquid sealed under vacuum. Steam temperature causes internal gas pressure, expanding diaphragm at bottom of float closing valve.

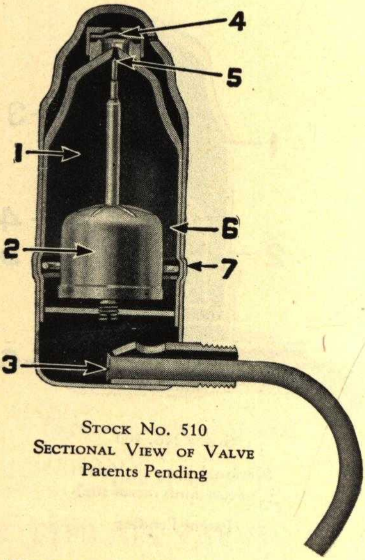
3. No seat "plug" or guide. Reduces to a minimum the liability of clogging from dirt and insures dry operation by preventing capillary attraction from holding water in suspension around the opening.

4. Proper area between float and shell allows water to drain from the valve when siphon operates.

5. Permanent machine rolled joint can never leak.

6. Siphon tube free to rotate during installation.

IDEAL VAC-AIRID VACUUM VALVE



Stock No. 510
Sectional View of Valve
Patents Pending

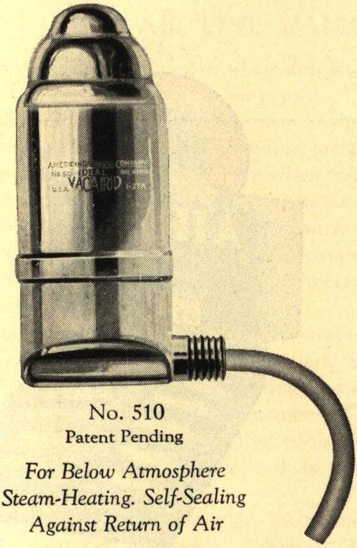
AN EXTERIOR TYPE AIR VALVE

For Venting Low Pressure Steam Radiators
Self Sealing Against Return of Air

Distinctive Features

1. Large separating chamber. Ample space for air and water to separate, insuring that only air will pass out the opening.
2. Float contains volatile liquid sealed under vacuum. Steam temperature causes internal gas pressure, expanding diaphragm at bottom of float closing valve.
3. Siphon tube free to rotate during installation.
4. Hand-ground Monel Air Seal. Permits free venting of the radiator but positively prevents air from re-entering the system through the Airid.
5. No seat "plug" or guide. Reduces to a minimum the liability of clogging from dirt and insures dry operation by preventing capillary attraction from holding water in suspension around the opening.
6. Proper area between float and shell allows water to drain from the valve when siphon operates.
7. Permanent machine rolled joint can never leak.

IDEAL VAC-AIRID VACUUM VALVE



No. 510
Patent Pending

For Below Atmosphere Steam-Heating. Self-Sealing Against Return of Air

AN EXTERIOR TYPE AIR VALVE

THE No. 510 Vac-Airid Vacuum Valve was developed in response to a wide and insistent demand for an exterior type Vacuum Air Valve that would embody the Airid principles. In countrywide use the Vac-Airid has proved a worthy companion valve to the famous Airid. There is a wide field for the sale of this valve on old jobs. For new work with the new type radiation use No. 2 In-Airid Air Valves (see page C19).

The venting and siphoning action is the same as the Airid, but while it vents freely no air can re-enter through the valve. To insure a perfect air seal each individual valve disc of Monel metal is ground in by hand. This is a new application of an old, time-tested mechanical principle that has been in successful use in high-class equipment for years but not used heretofore in air valves.

Guaranteed for Five Years

OPERATION

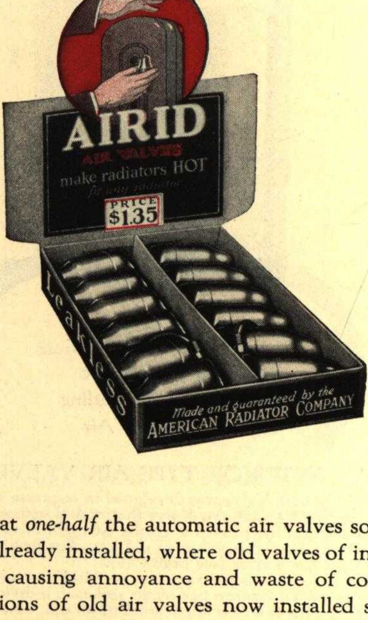
The VAC-AIRID is normally closed. A slight internal air pressure—only the fraction of an ounce—opens the valve and permits the venting of the air from the radiator. As soon as steam reaches the valve the vent closes instantly, which causes the air seal to snap shut so that no air can re-enter. The seal is not again broken until, in the normal operation of the heating plant, there is air to be eliminated.

Stock No. 510 Angle Connection, ⅛ inch, each	$4.00
Stock No. 512 Straight Shank, ⅛ inch, each	5.00

OTHER ACCESSORIES FOR VACUUM STEAM JOBS

To obtain the full benefit of vacuum air valves a No. 822 Ideal Vac-Vent Valve (see page C27) should be installed on each return and preferably No. 999 Arco Packless Valves (see page C5) used for radiator inlet valves. A No. 351 Arco Packless Water Gauge (see page C16) should be installed on the boiler.

IDEAL AIRID VALVE DISPLAY BOXES



IT is estimated that *one-half* the automatic air valves sold are for replacements on jobs already installed, where old valves of inferior design have worn out and are causing annoyance and waste of coal from air-bound radiators. The millions of old air valves now installed should be replaced with the improved modern Airid. This offers a profitable field to the dealer in heating material for sales "over the counter." A few Airids sold to owners of steam plants will bring orders for more and develop new customers for other lines.

An extensive advertising campaign is being carried on each year to create demand for Airids. Dealers can take advantage of this advertising by "tying up" their stores and show windows to the national campaign. Building owners will go to shops where Airids are in stock and are prominently displayed. An attractive window display of Airids will attract these buyers and increase sales.

To aid dealers in these sales No. 500 Airids are packed in attractive boxes—printed in four colors—ready for display, without extra charge. Twelve valves in each box. Shipping weight per dozen valves, 4 pounds.

IDEAL AIR VALVES

IDEAL AIR LINE VALVE

STOCK No. 816
Patent Pending

For venting steam radiators where drip line, air line or vacuum air line is used.

THE Ideal Air Line Valve operates on the same general principle as the Ideal Airid Valve. It is always open to the passage of air but closes tight when steam reaches it. Should water reach the valve, it remains open for passage of the water to the drip line. It insures a hot radiator but keeps the air line cold. Non-adjustable, cannot be "tampered" with, made entirely of metal, sensitive in operation.

When steam reaches the valve it vaporizes a volatile liquid contained within the thermostatic member, creating a gas pressure and expending outward the diaphragms which form the top and bottom of the member. This forces the pin to the seat, closing the valve. When the valve cools the vapor condenses, relieving the pressure and opening the valve. It is either wide open or closed tight.

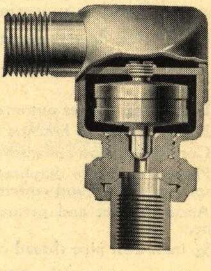
Nickel plated—⅛ inch radiator connection; ¼ inch female union on outlet. Packed 6 in a box. Weight of six packed, 2 pounds. List.....$3.50

IDEAL VENTO VENT

Patent Pending
Stock No. 817

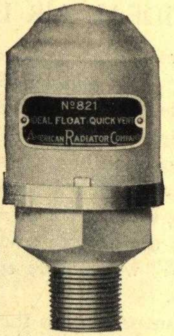
For Use on Vento Heaters and Blast Coils

THIS valve is designed particularly for relieving air from Vento heaters (low pressure only). It has a large venting port—3/16 inch diameter. Operates by volatile liquid contained within expansible member with diaphragm at top and bottom. No adjustment. All metal. Does not close against water. Connection to heater ⅜ inch pipe size. Outlet fitted with ¼ inch female union for air line. Can be set in any position. Nickel plated. Weight of six packed, 2 pounds. List Price, each $4.00



No. 817 VENTO VENT

IDEAL FLOAT QUICK VENT



Patents Pending

IDEAL FLOAT QUICK VENT

No. 821

FOR free venting of mains, indirect stacks, vento, coils, etc., or any steam piping where it is desirable to expel air quickly without developing back pressure. Closes against water.

EFFICIENCY AND ECONOMY

The proper use of Ideal Quick Vents on the basement piping opens the entire system to the atmosphere until steam or vapor is generated and circulated to the valves. This insures quick and even distribution of steam with fuel economy because there is no back pressure for the steam to work against. Air from the mains is vented into the basement and not into the rooms. Besides materially increasing the efficiency of the heating plant, Ideal Quick Vents improve operation and control.

DISTINCTIVE FEATURES

Large vent. Closes automatically against steam or water.

Heavy cast brass housing and base protect all working parts.

Corrugated, non-collapsible metal float.

Phosphor bronze diaphragms at both top and bottom of expansible member insure ample movement and extreme sensitiveness.

Accurately set and permanently locked at factory. No adjustments required at any time.

¾ inch iron pipe thread connection.

List Price, $6.00. Shipping weight, 2 pounds.

IDEAL VAC-VENT

No. 822
Patent Pending

IDEAL VAC-VENT

THE Ideal Vac-Vent is made especially for use with No. 2 In-Airid and No. 510 Vac-Airid Air Valves on "below atmosphere" steam heating plants. It is for venting the piping system in the basement and to prevent the re-entry of air. A large venting port insures quick and even circulation. The large non-collapsible float closes against water. The air seal closes against the re-entry of air exactly the same as in the No. 2 In-Airid or the Vac-Airid. Only one Vac-Vent is necessary for each set of mains.

Hand-ground Monel air seal snaps shut when air is eliminated from the main and no air can re-enter.

Large vent. Closes automatically against steam or water.

Heavy cast brass housing and base protect working parts.

Corrugated, non-collapsible metal float.

Phosphor bronze diaphragms at both top and bottom of expansible member insure ample movement and extreme sensitiveness.

Accurately set and permanently locked at factory. No adjustments required at any time.

¾ inch iron pipe thread connection.

List Price each, No. 822, $9.00. Shipping weight, 2 pounds.

IDEAL AIR VALVES

IDEAL QUICK VENT

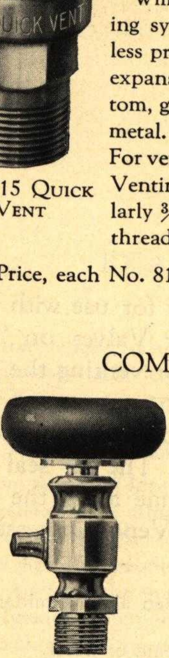
No. 815 Quick Vent

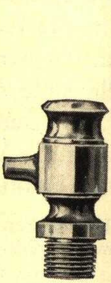
FOR venting mains, long runs of pipe, indirect stacks, drop risers, etc., where air must be expelled quickly, but where the valve is not required to close against water.

Will benefit all low pressure steam jobs by venting piping system and thereby heating radiators quicker under less pressure. Operates by volatile liquid contained within expansible member which has diaphragm at top and bottom, giving ample movement of stem. No adjustment. All metal. Will last indefinitely. Does not close against water. For vent valve to close against water see No. 821, page C26. Venting port 3/32 inch diameter. Valve connection regularly ¾ inch pipe thread. Can be furnished with ⅜ inch thread. Nickeled finish. Weight of 6 packed, 2 pounds.

List Price, each No. 815–¾ inch, No. 820–⅜ inch. $3.00

COMPRESSION AIR VALVES





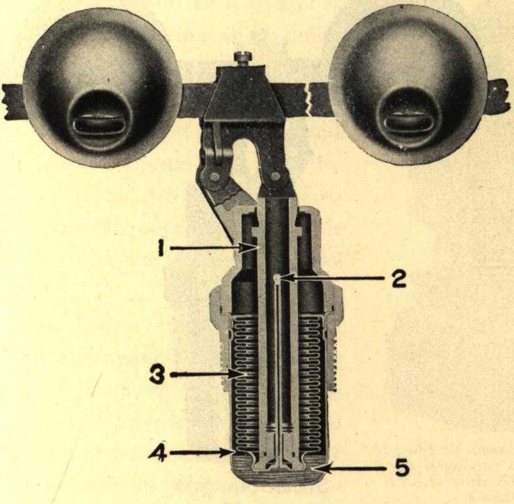
LIST PRICES

	Per Doz
Stock No. 520—Wood wheel, nickel plated, weight packed 1⅓ pounds dozen	$4.00
Stock No. 521—Key, nickel plated, weight packed 1¼ pounds dozen	3.00

Two keys regularly furnished with each dozen.

Extra Keys, 5 cents each, net.

ARCO WATER REGULATOR



No. 800

Patented Sept. 23, 1924. Patent Pending

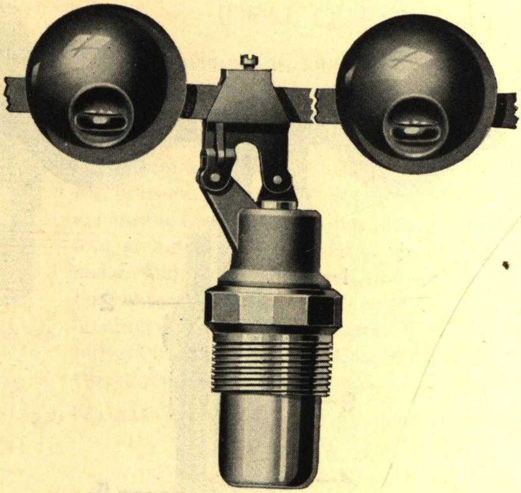
For Damper Control on Hot Water Boilers

DAMPER control on hot water boilers is as necessary as on steam boilers. It saves fuel by preventing over-heating, saves the inconvenience of attending to drafts, and gives the comfort of a steady water temperature.

DISTINCTIVE FEATURES

1. Stem transfers work from bottom of bellows, distributing travel equally to each fold.
2. Filling tube provides positive method of sealing liquid chamber. No chance of losing power through leak at filling point.
3. One-piece bellows made in our own factory. Lower head an integral part of bellows—not soldered.
4. Design provides extra long temperature range—100° to 220° standard.
5. Volatile liquid develops pressure on *outside* of bellows insuring long life, accuracy, and sensitiveness.

ARCO WATER REGULATOR



Stock No. 800

Patented Sept. 23, 1924. Patent Pending

For Damper Control on Hot Water Boilers

A DAMPER regulator designed for hot water boilers which will control the drafts so as to maintain a constant water temperature at any degree between 100° and 220° Fahrenheit.

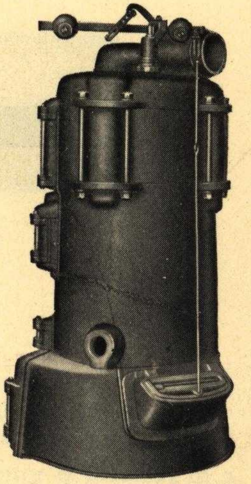
The Arco Water Regulator is made entirely of metal. Within the bulb is an expansion metallic bellows, surrounding which is volatile liquid. As the water temperature in the system increases, the liquid vaporizes and the gas pressure generated thereby compresses the bellows and forces upward the thrust rod or stem which tilts the lever and closes the drafts. As the water cools the gas pressure is relieved and the counterweight opens the drafts. There are no perishable parts to wear out. The action is sensitive and accurate. Adjustment for temperature is obtained by changing the position of weights on the lever.

DATA, DIMENSIONS AND PRICE

Length of bulb, 2⅞ inches. Connection, 2-inch standard pipe thread. Trimmings consist of one 37-inch lever, two four-pound weights, 12 feet of chain, two ceiling pulleys, four "S" hooks. Shipping weight, 15 pounds.

List Price $24.00

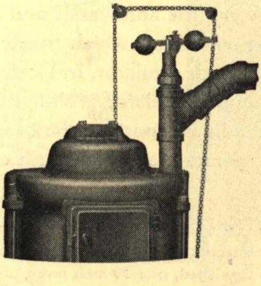
ARCO WATER REGULATOR



Method of installing No. 800 Arco Regulator on Ideal Arco Boilers with Arco Damper Control

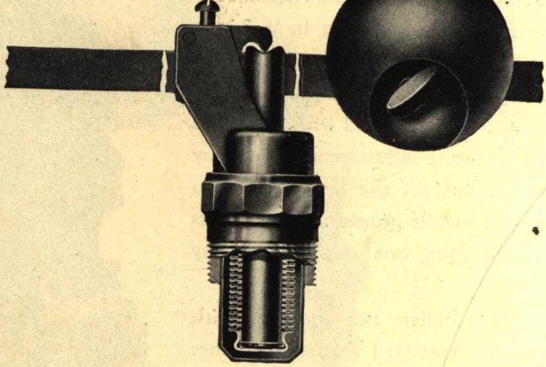
On Ideal Arco Boilers equipped with the Arco Damper Control, the Regulator is installed as shown by inserting in a 2-inch opening provided in the dome section of the boiler. It is connected to the damper by means of the lever and arms supplied with the Hand Control. Temperature adjustment is made by moving the weights on the lever bar. Two weights are supplied. If proper temperature is not obtained by using one weight, both may be used.

On other type boilers not equipped with Water Regulator a standard Y fitting (3 inches or larger) should be installed in one of the flow pipes and the Regulator inserted in the top opening by means of bushing (to 2 inch) as shown. Connection should be made to dampers with chain and pulleys. Temperature adjustment is made by moving weights on lever. For high temperatures both weights may be placed on rear of lever. Complete directions sent with each Regulator.



Method of installing No. 800 Regulator using chains and pulleys

ARCO JUNIOR WATER REGULATOR



Stock No. 801. Patented Sept. 23, 1924. Patent Pending

THIS regulator is designed especially for hot water supply boilers. The construction and operation is similar to that of the No. 800 Arco Water Regulator, described on page C29, but it is smaller and less powerful.

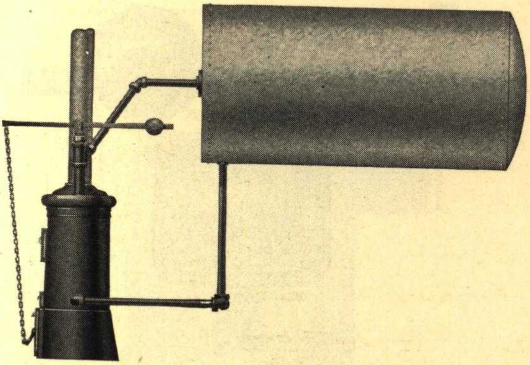
Damper control on hot water supply boilers is of vital importance, although it is frequently overlooked. Regulation saves fuel by preventing over-heating, saves attention to drafts and maintains constant water temperature. The Arco Junior Water Regulator prevents boiling, sputtering, steaming water at the faucets and insures plenty of hot water as long as there is sufficient fire in the heater. It also prevents the annoyance and waste caused by the fire burning out and requiring rekindling, which frequently occurs in hot water supply boilers not equipped with regulator. In localities where lime is present in the water, the Arco Junior Regulator prolongs the life of the heater by reducing to a minimum the lime deposit in the heater, since it prevents unnecessarily high water temperature at which most of the precipitation takes place.

DATA, DIMENSIONS AND PRICE

Length of bulb, 2 inches. Connection, 1½ inch standard pipe thread. Temperature Range 130° to 180° Fahr. Trimmings furnished, one 30-inch lever, one 3-lb. weight, 6 feet of chain, two "S" hooks. Shipping weight, 11 pounds.

Stock No. 801. List Price $16.00

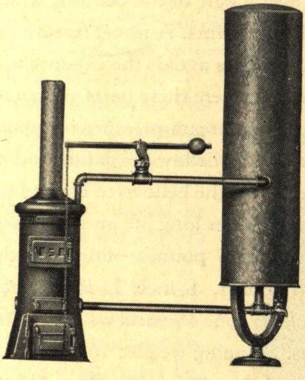
ARCO JUNIOR WATER REGULATOR



Method of installation on Hot Water Supply Boilers using Y fitting

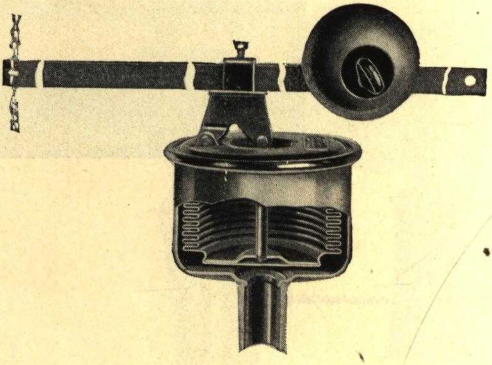
ON hot water supply boilers the regulator is inserted in a 1½ inch Y fitting or Tee as shown and connection made by chain to ash pit draft. Temperature adjustment is made by moving weight on lever.

Complete instructions furnished with each regulator.



Method of installation on Hot Water Supply Boilers using Tee fitting

ARCO STEAM REGULATOR



Patent Pending

Stock No. 905

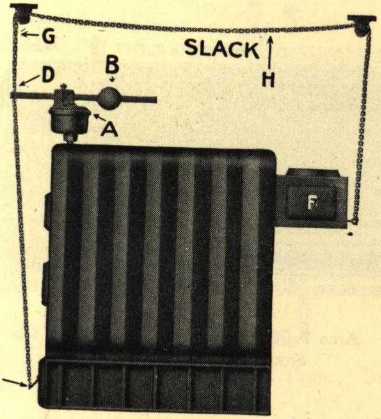
AN improved type of all-metal pressure regulator for controlling dampers on steam heating boilers. Extreme sensitiveness has been obtained by a new design of rocker. The operating element is a metallic bellows of our own design and manufacture. It is made from one piece of brass—not built up from discs. The head is an integral part of the bellows, which eliminates the possibilities of leakage at soldered joints. A novel feature of this new design is the steel body and steel rocker. This avoids the expense and annoyance of breakage which frequently occurs where these parts are made of cast iron.

The design is such that the steam pressure is applied to the *outside* of the bellows. This insures that the bellows expands and contracts evenly in all folds. There is no tendency for the bellows to tilt and unduly stretch the metal on one side. This feature insures long life and great sensitiveness.

For steam pressure up to 15 pounds—finely finished in black baked-on enamel. Connection to boiler, 1 inch I. P. S. male thread. Trimmings furnished; one 36 inch lever, one 4 pound weight, 12 feet of chain, two ceiling pulleys, four "S" hooks. Shipping weight, 16 pounds.

Stock No. 905. List Price $15.00

ARCO STEAM REGULATORS



With Boiler using chains

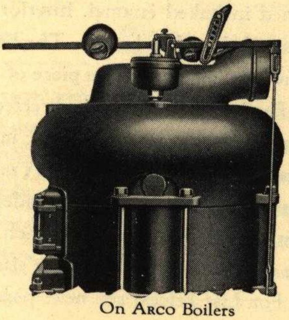
Adjusting Arco Steam Regulator

WITH no pressure on boiler and weight "B" in position on lever, connect chain between "D" and "E" so that draft "E" will be open as wide as desired for greatest draft. Connect "G" over pulleys to "F", leaving just enough slack so that chain "G" is taut when both drafts are closed. Set weight "B" so that lever "D" tilts when steam is raised to the pressure desired to be maintained.

When pressure increases, draft "E" will close and check combustion. If fire is clean and pressure should continue to increase, lever "D" will continue to move downward, opening check draft "F" to completely check fire. As pressure decreases "F" *will gradually close.* If pressure falls below the desired amount "E" will open.

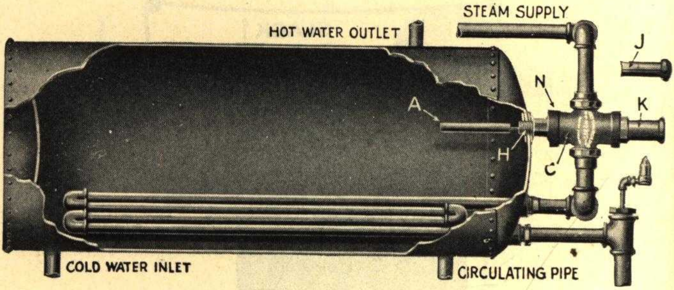
For best results, connections should be made so that draft "E" opens but slightly and draft "F" opens wide.

On Arco Boilers, draft should be connected by means of rods and "goose neck" lever as shown. Adjust connections as explained above, so that one draft closes before the other opens.



On Arco Boilers

ARCO TANK REGULATOR



Arco Tank Regulator. Direct connected type
Stock No. 825—Patent Pending

For automatic regulation of the temperature of water or other liquids heated by steam

For steam pressure up to 15 pounds.

FOR use in hotels, schools, office buildings, hospitals, apartment buildings, factories, public institutions.

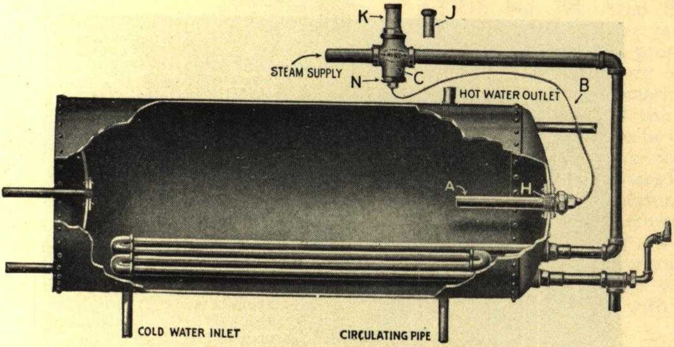
Employs a single seated valve, which eliminates the leak through the valve so common with double seated valves. Regulator can be placed in any position. It is sensitive, accurate and positive in operation. The valve has no stuffing box and cannot leak steam around the stem. It will not bind in operation, hence insures close regulation.

No moving parts are exposed, but are encased in a cast iron housing finished in baked enamel. Interior parts are of brass with renewable seat and disc of phosphor bronze. The bellows used in this construction is made from our own design, of one piece of brass—not from built-up discs.

Particular attention is directed to the novel method of grouping the sizes. Improvements in design have made possible the use of one regulator for several sizes. For example, Size A regulator is used for ½ inch, ¾ inch and 1 inch pipe connections. It is threaded 1 inch and sets of bushings are furnished with each regulator for ¾ inch and ½ inch, so that this one regulator can be used for any of the three sizes of pipe.

For List Prices, see next page.

ARCO TANK REGULATOR



Arco Tank Regulator. Flexible Tube Type. Stock No. 826.
Patent Pending

BOTH the flexible tube type and the direct connected type operate on the same principle. The operating power is the expansion of gas. Gas is readily responsive to temperature changes, hence, quick operation and close regulation. An increase in temperature of the water surrounding the bulb "A" increases the internal gas pressure in the bellows chamber (enclosed at "C") which forces up the head of the bellows and the valve stem, closing the valve. A slight cooling of the water causes a lessening of the gas pressure which allows the compression spring (enclosed at "K") to open the valve. Adjustment for temperature is made at "K" by means of a key "J". This feature prevents "meddlers" from tampering with the adjustment.

Temperature range regularly furnished 140° to 180° Fahr. Special temperature range supplied on special order. Both types for use on steam pressure up to 15 pounds only.

All sizes have iron body—brass interiors with bronze disc and seat. Sizes A and B have unions both ends. Sizes C and D have screwed ends. Flexible tube on No. 826 is regularly furnished 8 feet long. Regulators with longer tubes can be supplied on special order.

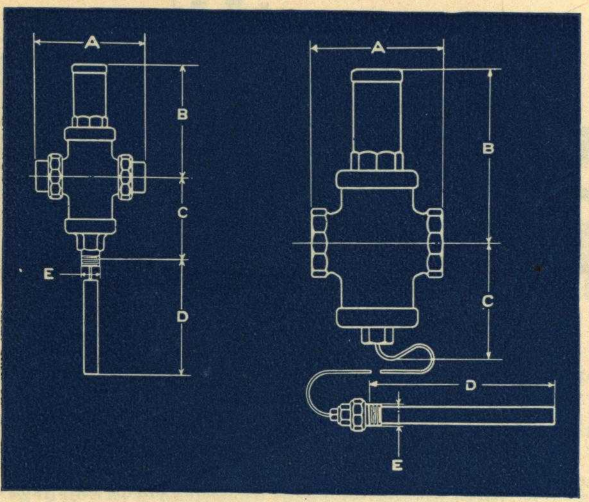
See next page for roughing-in dimensions and size and length of bulb.

LIST PRICES

Furnished complete with adjusting key and bushings. Full directions for installation with each regulator.

Stock No.	Size	For Pipe Connections	Type	Shipping Weights, lbs.	List Price
825	A	½ in.–¾ in.– 1 in.	Direct connected with unions...........	20	$50.00
825	B	1¼ in.–1½ in.	Direct connected with unions...........	25	60.00
826	A	½ in.–¾ in.–1 in.	Flexible Tube with unions...........	20	60.00
826	B	1¼ in.–1½ in.	Flexible Tube with unions...........	25	70.00
826	C	2 in.	Flexible Tube screwed ends.............	50	80.00
826	D	2½ in.–3 in.	Flexible Tube screwed ends.............	60	90.00

ARCO TANK REGULATOR



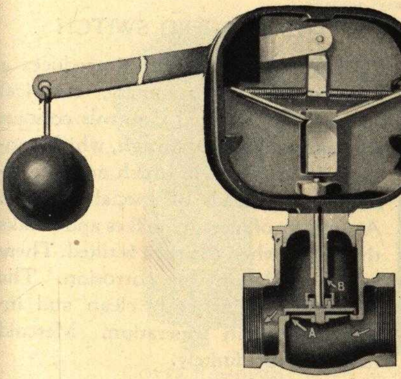
No. 825 No. 826

MEASUREMENTS

For Roughing-in Work

Dimension in inches................	A	B	C	D	E
No. 825 Direct Connected					
Size A for ½ in., ¾ in., 1 in. pipe...	7½	6	4⅞	6 9/16	1
Size B for 1¼ in. and 1½ in. pipe...	8 3/16	8½	6 1/16	8 9/16	1
No. 826 Flexible Tube..............					
Size A for ½ in., ¾ in., 1 in. pipe...	7½	6	7	5⅞	1
Size B for 1¼ in. and 1½ in. pipe...	8 3/16	8½	8¼	7⅞	1
Size C for 2 in. pipe...............	8¾	8½	8½	9⅛	1¼
Size D for 2½ in. and 3 in. pipe.....	9¾	12 11/16	10¾	15⅛	1¼

ARCO SNAP GAS VALVES



No. 791
ARCO SNAP ACTING GAS VALVE

THE No. 791 Arco Snap Acting Gas Valve is for use with thermostats, pressure regulators, temperature regulators, etc., to automatically turn on and cut off the gas supply. This valve can be used with the No. 905 Arco Steam Regulator, No. 800 Water Regulator, Room Thermostat and other similar controls. Use the No. 800 Water Regulator for hot water supply boilers. *Note:* This gas valve should not be used with the No. 801 Regulator.

OPERATION

The Snap Acting Gas Valves shown on this page are substantially built, and are for use with either natural or artificial gas. The ingenious toggle mechanism maintains full spring pressure on the seat until the valve snaps open. The valve being full open or closed tight, the instantaneous action prevents gas seepage and back fire.

LIST PRICES

Size	¾ in.	1 in.	1¼ in.	1½ in.	2 in.	2½ in.
List	$14.00	$16.00	$18.00	$20.00	$24.00	$40.00
Weight, in Carton	5¾ lbs.	6¾ lbs.	8 lbs.	8¾ lbs.	11¾ lbs.	21 lbs.
Height from Center of Run	7 3/16 in.	7⅜ in.	7⅝ in.	8 in.	9¼ in.	9 1/16 in.
Valve Length End to End	2⅝ in.	3 3/16 in.	3⅝ in.	4 in.	4 13/16 in.	7 in.

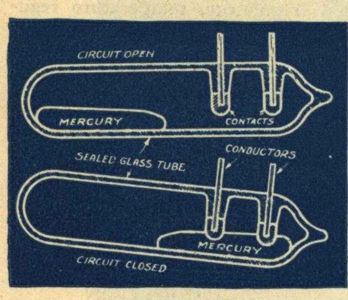
THE No. 833 Arco Thermosnap Gas Valve automatically controls the temperature of water and other liquids heated by gas. Especially adapted to range boilers and other tanks heated by gas. Increase in temperature closes valve; decrease opens valve. Snap action on both operations. Operates in any position. Adjustment of temperature is obtained by simply turning the indicator. Standard range 120° to 190°. Operating differential 12° to 15° depending upon setting. Cast iron body. All interior parts, except the phosphor bronze spring, are of non-corrosive metal. Special gas service disc. Knife edge valve seat. Threaded connection to tank or fitting is 1½ inch I.P.S. Pilot connection ⅛ inch.

No. 833
ARCO
THERMOSNAP
GAS VALVE

For ½ inch or ¾ inch Gas Connection .... List Price $16.00

MERCOID CONTROLS

THE MERCOID SWITCH



THE Mercoid Switch introduces a new era in automatic electrical control. All Mercoid Controls contain the famous Mercoid Switch, which consists of a glass tube in which are hermetically sealed leads of special material. A quantity of mercury makes and breaks the circuit when the tube is tilted. There is no oxidation or corrosion. The contact is permanently clean and instantaneous in operation. Mercoid tubes last indefinitely.

THE POWER ELEMENT

The Mercoid Switch is tilted by a power element which expands and contracts with changes in temperature, pressure or vacuum. It consists of a seamless metallic bellows, the folds of which are so made that expansion and contraction does not affect the life of the metal. The operation remains constant and years of service do not lessen its power or sensitiveness. When used thermostatically the bellows contain liquids of various boiling points, according to operating temperature desired.

CAPACITY

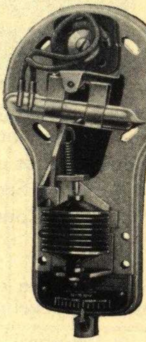
Mercoid Controls will carry motors of 1 H.P. or less within guaranteed ratings for a normal working load of 10 amperes at 110 volts, or 5 amperes at 220 volts either D.C. or A.C. any cycle. No relays, transformers or other intermediate controls are required. For motors drawing current more than rating a starting switch is used. This provides automatic control for electric units of any size.

USES

Mercoid Controls are used to automatically control the operation of oil burners, domestic and industrial refrigerators, unit heaters, buckwheat coal burners, and have hundreds of industrial uses. Mercoid Controls in connection with Arco Motor Valves are being widely used to automatically control the flow of steam, air, water, oil, gas, brine, etc. For example: A No. 848 Mercoid Temperature Control and the Arco Motor Valve provide an accurate, rugged, single seated Tank Regulator for high pressure steam.

NO. 845 MERCOID THERMOSTAT

(Patent Pending)



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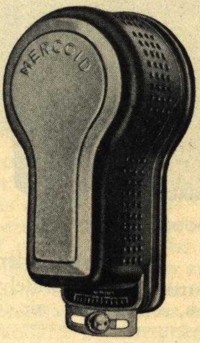


With Cover; Also Shows Adjustment Lock

THE No. 845 Mercoid Thermostat is for use where it is desired to make or break an electric circuit according to change in air temperature. Has many applications such as control of oil burners, unit heaters, refrigeration machinery, motors, pumps, fans, etc. This Thermostat in combination with the Arco Motor Valve (page C44) provides an accurate, durable control of factory offices or work rooms or for controlling temperature of buildings heated by central station steam. The motor valve is placed in the steam supply and is opened or closed by change in temperature at the thermostat.

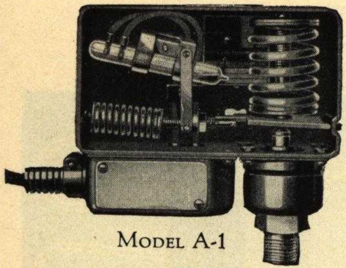
Adjustment for temperature is made by moving indicator at bottom. Can be furnished with locking feature on the adjustment. Standard ranges, for heating 56° to 80°, 38° to 60°: for refrigeration, 25° to 60°. Special ranges higher or lower can be furnished. For heating, No. 845 thermostats are finished in dull gold; for refrigeration, in black. Outlet box regularly supplied. Furnished with thermometer on cover on special order.

LIST PRICES

	For Heating 10 Ampere tube	For Heating 3 Ampere tube	For Refrigeration 10 Amp. tube
With single circuit, single pole switch............	$30.00	$27.00	$33.00
With two circuit single pole switch or double pole switch................................	36.00	30.00	39.00
Special Temperature Range, add to list...........	4.00	4.00	4.00
Locking feature with Key, add to list............	2.00	2.00	2.00
Thermometer on Cover, add to list..............	2.00	2.00	2.00
Shipping weight 2¼ pounds.			

Write for special bulletin on No. 845 Mercoid Thermostat.

NO. 848 MERCOID CONTROLS



Model A-1

THE No. 848 Mercoid Control operates on the same general principles as the No. 845, described on the preceding page. It can be furnished for control of pressure, vacuum or temperature. The No. 848 type not only has a wide adjustable range, but also has adjustment for differential. Send for complete catalog of No. 848 Controls.

Pressure Controls—Models A, B, C, D

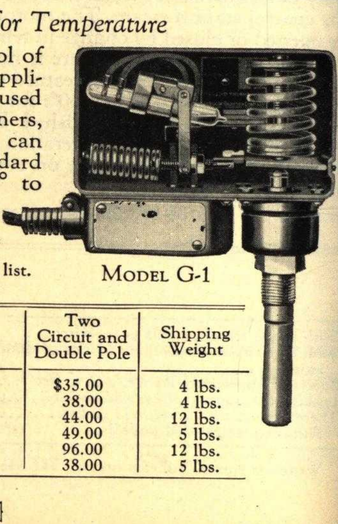
These instruments are widely used for pressure or vacuum control—for steam boilers, refrigerants, air compressors, pumps, water level control, etc.

Model	Adjustable Range	Differential	
		Minimum	Maximum
A-1	1 lb. – 15 lbs.	1 lb.	6 lbs.
A-2	30 in. Vac.– 3 in. Vac.	2 in. Vac.	18 in. Vac.
A-3	10 in. Vac.– 10 lbs.	2 in. Merc.	18 in. Merc.
B-1	10 lbs. – 60 lbs.	1½ lbs.	10 lbs.
B-2	10 in. Vac.– 45 lbs.	4 in. Merc.	36 in. Merc.
B-3	30 in. Vac.– 35 lbs.	4 in. Merc.	26 in. Merc.
B-4	50 lbs. –100 lbs.	2 lbs.	15 lbs.
B-6	0 lbs. –200 lbs., or		
	50 lbs. –250 lbs.	2 lbs.	8 lbs.
C	3 in. Vac.–3½ lbs.	1 oz.	8 oz.
D	30 in. Vac.– 0 in. Vac.	¼ in. Vac.	2 in. Vac.

Models G and H for Temperature

These instruments are used for control of liquid temperature. They have various applications for industrial work and are widely used as hot water boiler controls for oil burners, buckwheat burners, etc. Various ranges can be furnished from 15° to 260°. Standard range for hot water boiler control, 110° to 220°, Dif. 5° min. to 40° max.

Angle connection on G1 and H1 add $2.00 to list price. All controls can be equipped with 3 amp. switches; single circuit $3.00 less, two circuit or double pole $6.00 less than corresponding standard list.

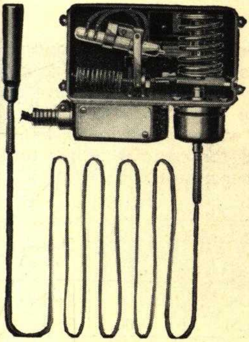


Model G-1

LIST PRICE

Model	Single Circuit	Two Circuit and Double Pole	Shipping Weight
A-1	$29.00	$35.00	4 lbs.
A-2, A-3, B-1, B-2, B-3	32.00	38.00	4 lbs.
B-4, C	38.00	44.00	12 lbs.
B-6	43.00	49.00	5 lbs.
D	90.00	96.00	12 lbs.
G-1 and H-1	32.00	38.00	5 lbs.

NO. 848 MERCOID CONTROLS



MODELS K AND L

Models K and L

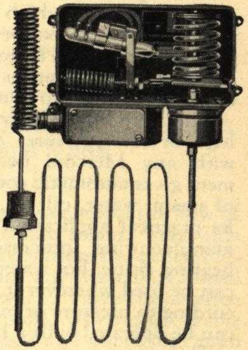
THE Model K or L Mercoid Controls are similar to Models G and H except that they provide remote control. They have a wide application in all fields where temperature control of liquids is required. The flexible tube is regularly furnished 4 feet long but on special order can be supplied up to 40 feet. Bulb furnished either with or without union. Extension sleeves and separable sockets can be supplied.

Various temperature ranges can be furnished from minus 30° to plus 600°. The Standard K instrument usually used for brine and drinking water control has a range from minus 30° to plus 60°, with a differential as close as 4° or as wide as 33°. The standard L instrument, used for domestic hot water control, has a range of from 122° to 195°, with control as close as 2° or as wide as 15°. Write for special catalog.

Models M and N

MODELS M and N Controls are used for the control of the temperature of air and other gases, such as dryrooms, ovens, warm air ducts, etc.

Various temperature ranges can be furnished from minus 30° to plus 600°. Differential as close as 2° or as wide as 40°. Supplied with or without threaded connection at coil or can be furnished with flange and with bulb uncoiled. Write for special catalog.



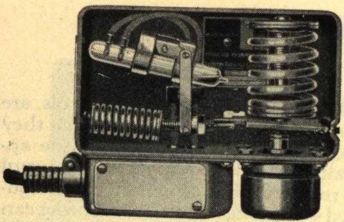
MODELS M AND N

LIST PRICES

Model	Single Circuit	Two Circuit and Double Pole	Shipping Weight
K-1, M-1 (Range—Minus 30° to plus 60°)	$50.00	$56.00	8 pounds
L-1 (Range—Minus 10° to plus 40°)			
L-1, N-1 (Range 10° to 70°)			
L-1, N-1 (Range 122° to 195°)			
K-1, L-1, M-1, N-1 (other ranges)	60.00	66.00	8 pounds
K-6, M-6 (Range 350° to 600°)	85.00	91.00	9 pounds

All of above can be equipped with 3 ampere switches; single circuit $3.00 less, two circuit or double pole $6.00 less than corresponding standard list.

For tubing of extra length over 4 feet, 25 cents net for each extra foot. Minimum charge $2.50. Galvanized armour on tube—5 cents net per foot, minimum charge $0.50.



Models R and S

MERCOID CONTROLS

Models R and S

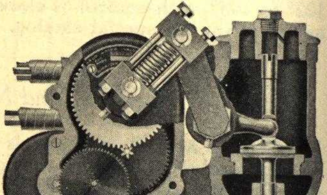
Models R and S are used for control of air temperature where close regulation is not necessary. Temperature ranges can be furnished from 10° to 260°. Model S with a range of 10° to 70° is widely used for control of air temperature in refrigeration.

LIST PRICES

Model	Single Circuit	Two Circuit and Double Pole	Special Range extra	Shipping Weight
R (Range 15° to 110°) S (Range 10° to 70°)	$40.00	$46.00	$4.00	5 pounds
With 3 ampere Switches	37.00	40.00	4.00	5 pounds

No. 847 Arco Motor Valve

THE No. 847 Arco Motor Valve is a complete unit consisting of a specially built motor which operates a high grade single seated valve through a train of gears. The single seated valve, closing with the pressure, makes a tight seat and reduces wire draw to a minimum.



No. 847

The Arco Motor Valve is designed for high or low pressures and when used with any Mercoid two-circuit instrument gives automatic control of the flow of steam, water, oil, air, gas, brine, etc. Its practical application for controlling manufacturing processes, dry kilns, heating, brine, hot water, cooking vats, sterilizers, etc. are almost limitless. It can be used wherever it is desired to automatically open or close a valve according to pressure or temperature change. If desired, the Arco Motor Valve can be operated with a hand switch for manual control.

The motor is the universal type for 110 volts, D.C. or A.C. 25-60 cycle. Draws ½ ampere at 110 volts during closing or opening—approximately 8 seconds. Requires no oiling.

LIST PRICES

No. 847 Arco Motor Valve:	Size A	Size B	Size C	Size D
For pipe sizes, inches	½, ¾, 1	1¼, 1½	2, 2½	3,4
Maximum working pressure, pounds	250	150	75	15
Shipping weight, pounds	28	32	40	65
List Price. Motor Valve	$120.00	$130.00	$145.00	$260.00

No. 846 Arco Motor Control

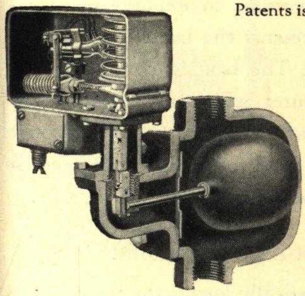
THIS consists of the motor, switch and gears as furnished for the Arco Motor Valve, but without the valve. An operating lever is attached to the main gear shaft, thus providing means to operate large valves, open and close drafts, or dampers, etc. List Price $90.00.

MERCOID CONTROLS

No. 612 Mercoid Control

Combination Pressure Control and Low Water Cut-out

Patents issued, 1,473,120, 1,644,935



No. 612 Control

THIS control is designed especially for use with oil burners and automatic stokers on steam boilers. The combination provides: first, a low water safety control that will automatically break the circuit in case the water in the boiler should fall to too low a level; and second, an automatic steam pressure control.

The combination thus furnishes a reliable safeguard against damage from low water and also saves the expense of equipping the boiler with a separate pressure control.

The standard control has an operating range of from ¾ pound to 8 pounds. The differential is adjustable for control as close as ¾ pound, to as wide as 5 pounds. Regularly supplied with outlet box and steel cover.

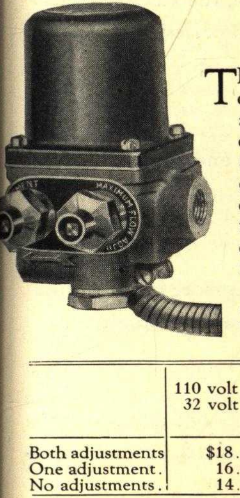
Full installation directions with each shipment.

LIST PRICES

	Single Circuit	Two Circuit and Double Pole	Shipping Weight
With 10 Ampere Switch	$44.00	$50.00	38 pounds
With 3 Ampere Switch (also used for low voltage)	41.00	44.00	38 pounds

Arco Solenoid Valve

No. 682—Pat. Pending



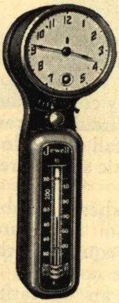
THE Arco Solenoid Valve is used to control the flow of oil, gas, water, air or low pressure steam. Has wide application in oil burning, refrigeration and general industrial use. It can be used with any Mercoid Control (single circuit type) or hand switch. Valve closes when circuit is broken or if current fails. When open, valve draws 7 watts. Adjustable bypass and adjustable main flow. Pipe connections ⅜ inch. Port opening 3/32 inch diameter—larger on special order. For pressures up to 50 pounds. Also furnished for higher pressures.

Where Impact Plunger for higher pressures is required, add $2.00 to the list price. Impact Plunger will regularly be supplied on orders with specification of orifice and pressure requiring its use.

LIST PRICES. STOCK No. 682

	110 volt 60 cy. 32 volt D.C.	110 volt 25 cy. 220 volt 60 cy. 220 volt 25 cy. 115 volt D.C.	440 volt 25 cy. 230 volt D.C.	440 volt 60 cy. 550 volt 60 cy.	550 volt 25 cy.
Both adjustments	$18.00	$19.50	$20.00	$22.00	$23.50
One adjustment	16.00	17.50	18.00	20.00	21.50
No adjustments	14.00	15.50	16.00	18.00	19.50

JEWELL TEMPERATURE REGULATOR



Model J-8
Eight-Day
Clock
Thermostat

THIS regulator with its various combinations of thermostat and motor represents the latest development of automatic draft control. The heating contractor will find many distinctive features which make the Jewell Temperature Regulator attractive and useful to the house owner, and easy to install. Send for special booklet illustrating the complete line of Jewell temperature regulators.

Model J-8 Eight-Day Thermostat

The clock feature automatically lowers the temperature at night and raises it in the morning at any hour desired. Winding the clock once a week is all the attention required. Standard finish statuary bronze.

Model J-1 One-Day Thermostat

With this instrument it is necessary to wind the clock once every 24 hours. By setting the indicator back to the night temperature, the clock will automatically raise the temperature in the morning at any time desired. Standard finish statuary bronze.

Model J-O Plain Thermostat

This model has no clock and is designed for use where one temperature level is satisfactory. Standard finish statuary bronze.

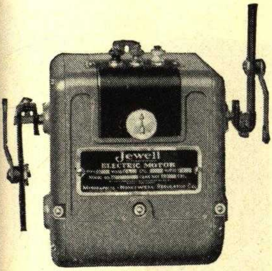
Model J. G. Gravity Motor

Motive power supplied by a 10 pound weight. Requires more frequent winding than the J. S. Spring Motor. Two dry cells used for operating current.

Model J. S. Spring Motor

Power furnished by a coil spring. Will give 60 to 75 operations on one winding. Indicator shows condition of spring. Requires two dry cells for operating current.

JEWELL TEMPERATURE REGULATOR



MODEL J-E MOTOR

Model J-E Electric Motor

THIS model is operated by a small electric motor and is connected to the house lighting circuit. This is the most popular model, since no winding is required. Motor completely housed in dustproof oil-tight cover.

LIST PRICES

Stock No.	Model	Shipping Weight Pounds	Price
300	J-0 Plain Thermostat	2	$31.00
301	J-1 One Day Clock Thermostat	4	42.00
308	J-8 15 Day Clock Thermostat	5	60.00
321	B-2 Immersion Aquastat	4	30.00
330	70 Pressure Regulator for Steam	4	30.00
323	A-1 Vaportrol, for Low Pressure Vapor	2	18.00
329	B2F Limit Control for Warm Air	4	30.00
325	E-1 Surface Aquastat	2	24.00
331	J-G Gravity Motor	20	25.00
332	J-S Spring Motor	16	36.00
333	J-E Electric Motor 110 V. 60 Cy. A.C.	8	60.00
327	G-S Transformers		3.00
328	Thermostat Guards		23.00

To obtain the list price of a complete regulator, add the list prices of the units to be ordered. The necessary fittings for installation are included. State clearly that a regulator is wanted and list the models that are wanted by model number and stock number.

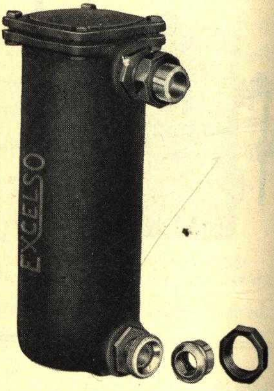
Extra charge of $2.50 net for current specifications other than 110 volt, 60 cycle AC for the J-E. Motor.

Batteries are not furnished. Any standard make of dry cell is satisfactory.

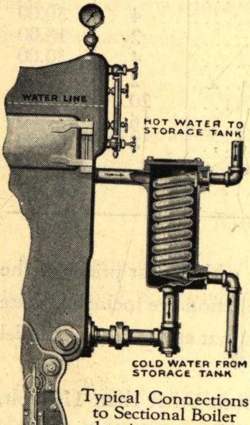
EXCELSO WATER HEATER

For Heating Domestic Water Supply with Steam and Vapor Boilers

Stock No. 740



THE Excelso Heater is connected externally to the boiler below the water line. The hot water from the heating boiler circulates through the heater around a copper coil through which passes the domestic water. The water in the heating boiler is always hot so long as there is fire in the fire pot, hence hot water for domestic use will always be obtained whether the fire is banked or whether there is pressure in the system. This type of heater can never boil the water in the tank nor cause pounding in the pipes or scalding steam at the faucets. It does not affect combustion in the boiler, as the coil is not in contact with the coal. It simply has the effect of adding the equivalent of a small amount of radiation to the boiler.



Typical Connections to Sectional Boiler showing removable coil Excelso Single Coil Heater

The Excelso Heater saves greatly in fuel as compared with the method of operating second heater, either coal or gas, since during the greater portion of the year the second fire may be eliminated. A small hot water supply boiler is generally used for the summer and is cross-connected to the Excelso Heater, so that when one fire is extinguished the other may be started immediately. This means a saving in fuel and operating care, since only one fire is required throughout the whole year.

See page C50 for capacities, dimensions and price.

EXCELSO WATER HEATER

Stock No. 740

Showing Double Coil Construction of Nos. 25, 26, 27 and 28

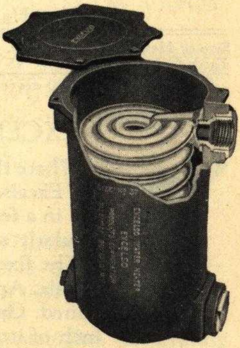
EXCELSO Double and Triple Coil Heaters, numbers 25, 26, 27, 28, 35, 36, and 37 are of the same construction as all other sizes. Ground Joint connections, removable coil, all brass connections, simple to install with a minimum amount of labor because of ease with which connections to boiler and tank can be made.

They may be used in batteries of two or more heaters on installations where great quantities of hot water are required, such as large apartments, hotels, hospitals, turkish baths, etc. These Heaters are built to give a maximum amount of service at the lowest possible cost.

All Excelso Heaters when used in connection with oil fired boilers may be operated economically the year round, eliminating the need of firing a tank heater during the summer months.

The Excelso Heater is also variously used in factories and large buildings of all kinds. It is particularly well adapted to take the place of a steam coil in a storage tank where live steam is available. Send for booklet showing many special applications.

Excelso Heaters are made of cast iron with removable copper coil, attached by ground joint connections. Sizes 11 to 15 inclusive and Junior Heaters are regularly equipped with unions on tank connections. Junior Excelso has expanded coil connections. Water for domestic use comes in contact with copper or brass *only.* No packing. See page C50 for list prices and data.



Showing Triple Coil Construction of Nos. 35, 36 and 37

EXCELSO INDIRECT WATER HEATERS

EXCELSO Indirect Heaters are also used to supply hot water radiation for heating garages, enclosed verandas or wherever additional radiators may be required. Excelso heated radiators remain hot throughout the night, even when the steam radiators are cold.

For radiator load multiply the below water line tank capacity by 1.5. For example: No. 26 Excelso tank capacity, 200 gallons. Radiator capacity, 300 square feet.

All external heaters should be selected for the work required and not the size of the tank which is frequently too small. Additional capacity should be allowed if a circulating system is used. Excelso Heaters can be furnished with special corrosion resisting coils for use as pre-heaters on oil burning equipment.

The tax on the heating boiler when Excelso is used is equal to approximately 1⅓ square feet of radiation for each gallon of water heating capacity.

STOCK NO. 740—DIMENSIONS—PRICE LIST—CAPACITIES

Size of Heater	Jr.	11	12	13	14	15	25	26	27	28	35	36	37
Length, inches	8½	10½	14	11½	15	19½	12½	15	19	23¼	21	25	29
Diameter, inches	5	5	5	6½	6½	6½	9	9	9	9	13¾	13¾	13¾
Shell openings, inches	1	1	1	1½	1½	1½	2	2	2	2	3	3	3
Coil openings, inches	¾	¾	¾	1	1	1	1½	1½	1½	1½	2½	2½	2½
Weight, c'rt'd, pounds	11	17	23	31	39	46	58	68	82	95	185	210	240
List Price	$12.50	$30	$40	$50	$60	$70	$120	$150	$180	$210	$310	$400	$490

HEATING WATER BELOW WATER LINE OF STEAM OR VAPOR BOILERS

Size	Jr.	11	12	13	14	15	25	26	27	28	35	36	37
Gals. Tank Capacity	30	30 32 40	42 52	60 66	82 90 100	120 144	160	180 220	250 300	372 420	600	800	1000

Temperature rise 100 degrees in 3 hours.

HEATING WATER WITH LIVE STEAM

Size of Heater	Jr.	11	12	13	14	15	25	26	27	28	35	36	37
Tank Capacity	45	50	75	100	150	200	250	300	450	600	900	1200	1500

Temperature rise 100 degrees in 3 hours at 5-pound pressure.

EXCELSO ROTARY HACK SAW

STOCK
No. 739

Where the boiler is not provided with tappings for the heater, the Excelso Rotary Hack Saw will cut openings of the correct size in a few minutes. All Steam Boilers manufactured by us are regularly supplied with tappings for Excelso Heaters.

The Excelso saw makes a clean circular cut in iron or other metals. Applicable to all kinds of work when tappings are required. Operated in an ordinary brace, it will cut through ¼ inch of iron in a few minutes. Shipped complete with two sets of blades for each size, 1 inch, 1¼ inch, 1½ inch, 2 inch.

$7.50 net each.

EXCELSO DUAL INDIRECT WATER HEATERS

Size of Heater	No. 42	No. 44	No. 46
Length—Inches	21½	25¼	29¼
Width—Inches	26	26	26
Diameter—Inches	13¾	13¾	13¾
Shell Opening—Inches	4	4	4
Coil Opening—Inches	3	3	3
Weight—Crated, Lbs.	360	410	470
List Price	$610	$780	$950

HEATING WATER BELOW WATER LINE OF STEAM OR VAPOR BOILER

Size of Heater	No. 42	No. 44	No. 46
Gals. Tank Capacity	1200	1600	2000

Temperature rise 100° in 3 hours

HEATING WATER BELOW WATER LINE OF STEAM OR VAPOR BOILER, USING HOURLY BASIS

This method of computing capacities is recommended when installing Excelso Indirect Heaters on intermittent oil or gas fired boilers; capacities based on 100° temperature rise in one hour. Especially is it good practice to select heaters on hourly-capacity basis when used with oil fired boilers for summer and winter use.

Size of Heater	No. 42	No. 44	No. 46
Gals. Tank Capacity	400	533	666

Temperature rise 100° in 1 hour

HEATING WATER WITH LIVE STEAM

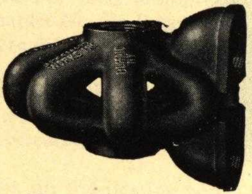
Size of Heater	No. 42	No. 44	No. 46
Gals. Tank Capacity	1800	2400	3000

Temperature rise 100° in 3 hours at 5-lb. pressure

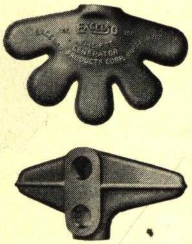
These new Excelso Dual Water Heaters are recommended for heating large quantities of water for apartments, hotels, mercantile buildings, schools, Y. M. C. As., and institutions of that type.

EXCELSO DIRECT WATER HEATERS

No. 741 Excelso Phaeton Heaters
No. 722 Excelso Fire Pot Generators



No. 741 Phaeton



No. 742 Generator

FIT any type of hot water boiler or hot air furnace and are so designed as to be entirely above the fire. Phaeton Heaters regularly furnished with side and top and bottom tappings. Made in either cast iron or brass. Fire pot generators also made in galvanized iron.

LIST PRICES AND DATA

No. 741 Phaeton Heaters

Diameter	6 in.	8 in.	10 in.	12 in.	15 in.	18 in.
Height	3½ in.	4½ in.	5¼ in.	6 in.	7 in.	8 in.
Tappings	1 in.	1 in.	1½ in.	2 in.	2½ in.	3 in.
Center to Center of Side Outlets	2½ in.	2½ in.	3 in.	3½ in.	4½ in.	5½ in.
Capacity, gallons	30	45	80	100	150	250
Square Feet Direct Water Radiation	40 ft.	75 ft.	100 ft.	150 ft.	250 ft.	400 ft.
Shipping Weight	6 lbs.	11 lbs.	18 lbs.	30 lbs.	60 lbs.	85 lbs.
List Price, Iron	$7.50	$12.00	$20.00	$24.00	$50.00	$70.00
List Price, Brass	15.00	28.00	45.00	54.00	115.00	160.00

No. 742 Fire Pot Generators

	Tank Capacity	Black Iron		Galvanized Iron		Brass	
		Weight	List	Weight	List	Weight	List
No. 1...	40 gals.	9 lbs.	$8.00	9½ lbs.	$10.00	9 lbs.	$18.00
No. 2...	60 gals.	12 lbs.	12.00	13 lbs.	15.00	14 lbs.	27.00

Nos. 743, 744 Excelso Fin Pin Heaters

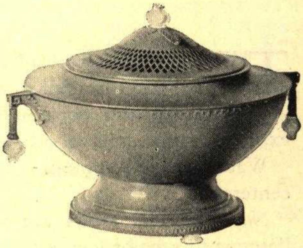
AN efficient hot water supply heater for down in the fire pot of warm air furnaces and hot water heating boilers. The fins allow air passage around heater, thus avoiding deadened fire. Well designed for quick circulation. Easy to install. Has five tappings to meet all requirements.

LIST PRICES AND DATA

	Tank Capacity	Black Iron		Galvanized Iron		Brass	
		Weight	List	Weight	List	Weight	List
No. 30.....	30 gals.	7½ lbs.	$3.75	8 lbs.	$6.00	9 lbs.	$16.00
No. 40.....	40 gals.	8½ lbs.	4.40	9 lbs.	7.00	14 lbs.	18.00

Stock No.: Iron 743; Brass 744.

ARCO HEALTH HUMIDIFIER



(*Patented*)

Stock No. 400

THE Arco Health Humidifier supplies the needed humidity for homes, offices, hospitals, stores and other rooms artificially warmed. Can be connected to any light socket or base plug and used in different rooms as required. It is equipped with an automatic cut-out designed to cut off the current when all of the water is evaporated.

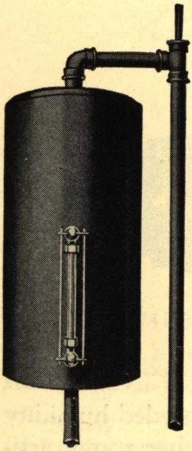
A few drops of Arco Health Extract in the water produces the mild, soothing fragrance of spring-time outdoor air or a little perfume can be used in the water to quickly dispel cooking odors.

Physicians recognize the need of humidity and prescribe special extracts for use in Arco Health where there are disorders of the nose, throat or lungs.

The Arco Health is securely packed in an individual box complete with gravity re-set safety cut-out, cord with hand switch and a bottle of Arco Health Extract.

Price Complete $15.50

GALVANIZED EXPANSION TANKS



STOCK No. 491

THESE tanks are made of steel, heavily galvanized, and are good for full rated capacity.

Tapped top and bottom for 1 in. overflow and expansion pipe, and on side for feed pipe.

Water Gauge Tappings—½ in.—13½ in. between centers.

Note: Special tanks are required for "Tank-in-Basement" jobs or for any installation where tank is used under pressure.

Water Gauge: Stock No. 494—List price, $1.75. Weight, packed, 1¾ lbs.

LIST PRICES FOR TANKS

Style	Size Inches	Nominal Capacity Gallons	Square Feet of Radiation	Price of Tank
1	12x20	10	300	$ 8.00
2	12x30	15	500	9.00
3	14x30	20	700	12.50
4	16x30	26	950	14.00
5	16x36	32	1300	15.00
6	16x48	42	2000	16.50

IDEAL EXPANSION TANK BRACKET

TAKES all sizes of tanks, from 10 to 16 in. diameter. Labor-saving—can be attached in a few minutes. A substitute for the old-fashioned shelf, and at less expense. Made of cast iron. Weighs about 6½ lbs. and is shipped with screws packed under the slide pieces.

List Price, each, complete, $1.75

STOCK No. 497

BLACK STEEL STANDARD STORAGE TANKS

For Working Pressure Not Exceeding 65 Pounds per Square Inch

Stock No.	Size	Nominal Capacity Gallons	Approximate Weights Pounds	List Price
415	20x 4	66	270	$ 94.00
416	20x 5	85	310	104.00
420	24x 4	100	330	109.00
421	24x 5	120	380	123.00
422	24x 6	140	440	134.00
428	30x 4	150	430	143.00
429	30x 5	180	500	158.00
430	30x 6	220	560	173.00
431	30x 7	250	630	196.00
432	30x 8	295	700	211.00
438	36x 6	315	700	206.00
439	36x 7	365	780	241.00
440	36x 8	420	870	256.00
442	36x10	525	1030	293.00
444	42x 6	430	890	276.00
445	42x 7	500	980	310.00
446	42x 8	575	1070	333.00
448	42x10	720	1250	375.00
449	42x12	865	1430	415.00
699	42x14	1000	1620	468.00

Unless otherwise specified horizontal tanks will be shipped. All tanks regularly equipped with six tappings:

24-inch Tanks 1½-inch tappings

30-inch, 36-inch and 42-inch Tanks 2-inch tappings

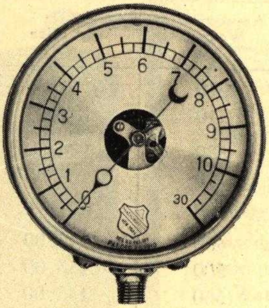
Hand-holes, list price, $8.00. Manholes in head, weight 100 pounds, list price, $30.00; in shell, weight 200 pounds, list price, $45.00. Extra openings, list price, 2 or 2½ inches, $8.00; 3 or 3½ inches, $9.00; 4 inches, $10.00. Tanks under 24 inches in diameter cannot be furnished with manhole. Tank legs, per set of three, list price, $3.00. Dimensions—7¾ inches floor to tank; 8¼ inches over all.

Orders for tanks not subject to cancellation.

Prices of special tanks, galvanized tanks, tanks with coils, or tanks for working pressure higher than 65 pounds on application.

STEAM AND ALTITUDE GAUGES

Retard Pressure and Compound Gauges



Stock No. 579

With Bourdon Spring

THESE gauges are especially designed for house heating low pressure boilers. They provide great spread of scale between 0 and 10 pounds with ¼-pound graduations, thus making easy and accurate reading of the low pressures carried on heating boilers. Will register up to 30 pounds. Accurate and positive.

Size 4½ inches; steel case without back flange; hard rubber-finish; without cock.

	List Price
Stock No. 579—Pressure only, 4½-inch	$6.00
Stock No. 580—Compound Pressure and Vacuum, 4½-inch	8.00

Steam and Compound Gauges

4½-inch steel case, without cock. Graduation 0 to 30 pounds equally divided.

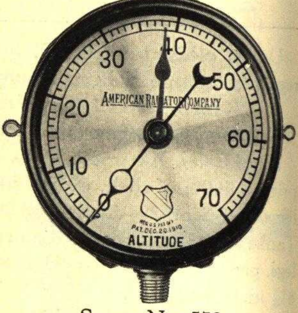
	List Price
Stock No. 577—Pressure only, 4½-inch	$5.00
Stock No. 575—Compound Pressure and Vacuum, 4½-inch	6.00

Ideal Altitude Gauges

Indicate accurately, at the boiler, the height of water in the system.

Explanation: When the water is at its proper level in expansion tank, remove the ring and glass, and set the stationary red hand at the pressure indicated by the working hand; whenever the pressure falls below this point, water should be added.

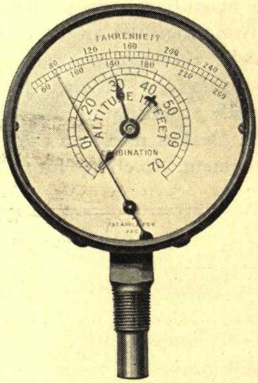
Size, 4½ inches; steel case without back flange; no cock. Threaded ¼-inch pipe connection. List Price each, $5.00. Weight 2 pounds boxed.



Stock No. 578

Note—All of above gauges can be furnished with customer's name on the dial if desired.

COMBINATION
ALTITUDE GAUGE AND THERMOMETER



Stock No. 588

THIS instrument indicates height of water and temperature of water on the same dial. One instrument in place of two.

The temperature is indicated by the position of hand on a wide scale clearly marked in degrees Fahrenheit. Provides quick and easy reading of temperature. A great convenience on any job and of especial value if boiler is in a dark basement where it is difficult to read the ordinary glass thermometer. Saves contractor time and labor at installation.

Indicator for temperature is operated by the expansion of special thermostatic metal. Temperature of water is shown accurately at any degree. This instrument contains no mercury or liquids of any kind. Altitude Gauge operates by Bourdon Spring. Carefully made and tested.

Data: Steel case, hard rubber finish, without cock. Rim removable. Threaded connection ½ inch, weight 2½ pounds boxed.

Stock No. 588, {3½ inch dial. List Price $12.00
{4½ inch dial. List Price $15.00

IDEAL HOT WATER THERMOMETERS

No. 560

THE Ideal Red Case Thermometer is a most accurate and satisfactory heating thermometer. It has a large magnifying tube so that it can be easily read and its trim lines are in keeping with modern boilers. Straight thermometer can be faced any direction. Thread on stem ½ inch I.P.S. Each thermometer is very carefully packed and protected against damage in shipment. Dealers name on the scale makes a lasting advertisement. No charge for names in lots of 25 or more.

	List Price Each
Stock No. 560, Hot-Water Thermometer, straight, weight packed ¾ pound	$5.00
Stock No. 561, Hot-Water Thermometer, angle (for use on risers, or circulating pipe), weight packed ¾ pound	6.00

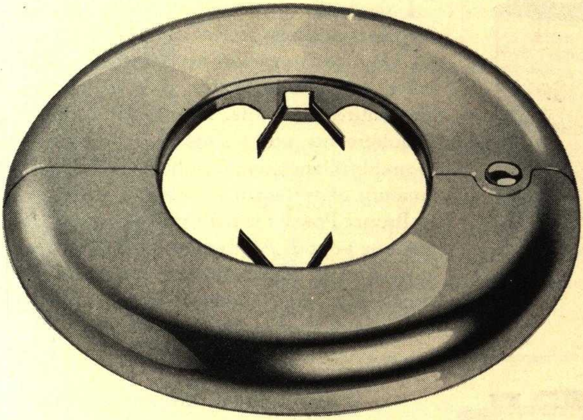
THE Ideal Dial Thermometer is rapidly becoming popular. Its shape and method of indicating temperature closely follows the precision instruments used for industrial and laboratory work. Its appearance on the boiler is unusually pleasing. The bold, black markings and the black hand stand out clearly against the clear, white face. Easily readable even in a poor light. The case has a black baked-on rubber finish. Made with straight or angle connection. Width of case 3½ inches. Threaded connection ½ inch I.P.S. No extra charge for names in lots of 25 or more.

No. 550

	List Price Each
Stock No. 550, Hot-Water Thermometer, straight, weight packed 2 pounds	$5.00
Stock No. 551, Hot-Water Thermometer, angle, weight packed 2 pounds	6.00

ARCO COMBINATION STEEL PLATE

For Floor or Ceiling



No. 100

THIS plate is made of heavy, cold rolled steel. Highly finished nickel over heavy copper plate, equipped with tempered steel tension springs which hold the plate firmly in place. Heat of pipe does not affect the tension of these springs.

Plate opens wide and is closed around the pipe with slight pressure. The hinge is strong and will not bend. Quickly and easily installed.

This plate can be cut with shears to fit irregular installations. Furnished in sizes from ½ inch to 4 inches, inclusive. Packed in dozen of a size, in cartons.

LIST PRICES

Size	½ in.	¾ in.	1 in.	1¼ in.	1½ in.	2 in.	2½ in.	3 in.	3½ in.	4 in.
No. 100 each	.27	.28	.32	.35	.38	.45	.65	.80	1.00	1.25
Weight No. 100 in pounds per dozen packed	1	1	1¼	1½	1¾	2¼	2¾	3¼	4	4¼

DECORATING MATERIAL

Ideal Radiator Bronze

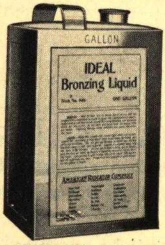
Stock No. 652

THE use of a superior quality of bronze in the decorative treatment of Radiators adds greatly to the attractiveness of Radiator heating.

After many years of experiment and experience we offer a grade of bronze powder exactly suited to decorating Radiators. The bronze is made for special requirements, and a single trial will prove the exceptional brilliancy and durability of its lustre, and large amount of surface per pound it covers.

Bronze Powder is put up in screw-top cans containing one pound. Aluminum is also put up in one-half pound cans. Gold Bronze (pale, rich and deep), Stock No. 652. Copper Bronze, Stock No. 653. Aluminum Bronze, Stock No. 654.

Ideal Bronzing Liquid



Stock No. 646

Bronzing Liquid of high grade must be used with bronze powders to obtain satisfactory finish and lustre. The finest and most brilliant Bronze can not produce satisfactory results unless the liquid is of equally good quality. IDEAL Bronzing Liquid is specially prepared for us. It mixes quickly with the powder, flows evenly, and gives a hard varnish surface without dulling the lustre of the bronze. Put up in gallon, half gallon, and quart cans—weight of one gallon can, 8 lbs.

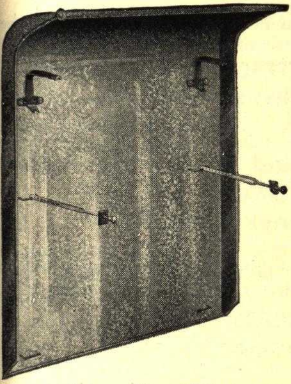
Black Asphaltum

Stock No. 647

For the painting of boilers and risers, we offer a Black Asphaltum of great covering capacity and durability, put up in one-gallon, half-gallon, and quart cans, and in barrels.

A first-class covering in every respect. Gives satisfaction to all who use this kind of varnish. Weight in cans 8½ lbs. per gallon.

IDEAL RADIATOR SHIELDS



Stock No. 906

CAN be readily fitted to Radiators of all varying constructions, as the brackets can be quickly shifted to connect with any make of Radiator. They do not interfere with the operation of the radiator valves or air valves, side piece being only 2 inches wide.

Trimmings furnished—Two cast iron top brackets (Part No. S-10), four adjustable hangers (each hanger consists of hook S-11, threaded rod S-12, knob S-13 and cast plate S-14), four loops S-15, necessary bolts.

No. 26 gauge material regularly furnished.

As regularly made shield extends down to within 7 inches of the floor.

LIST PRICES

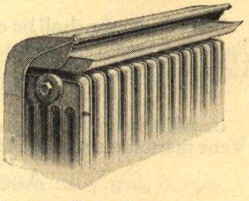
Height of Radiator Inches	26 or lower 5 Sec. or less	32 and 38 5 Sec. or less	44 5 Sec. or less	
Shields from Black Sheets	$6.00	$6.40	$6.80	Radiators larger than 5 sec. add 20c for each additional section.
Shields from Galvanized Sheets	7.20	7.60	8.00	Radiators larger than 5 sec. add 24c for each additional section.
Brass, having Galvanized Iron Backs	34.00	34.80	35.20	Radiators larger than 5 sec. add 60c for each additional section.
All Brass	36.00	38.00	39.20	Radiators larger than 5 sec. add $1.20 for each additional section.
Black, painted or bronzed plain colors	8.00	8.40	8.80	Radiators larger than 5 sec. add 60c for each additional section.
Galvanized, painted or bronzed plain colors	9.20	9.60	10.00	Radiators larger than 5 sec. add 64c for each additional section.

Add $6.00 to above List Prices for Black or Galvanized Vapor Pan.

Add $12.00 to list for Brass Vapor Pan.

In ordering indicate (1) whether single, two, three, four column or Window Radiation; (2) name and height of Radiator; (3) number and length of sections.

Orders not Subject to Cancellation



Vapor-Pan Attachment (Showing Pan Withdrawn)

SPECIFICATION FORMS

For the convenience of Architects and Engineers, we are listing below the correct form for specifying Ideal Heating Accessories.

FOR STEAM HEATING

Arco Packless Steam Radiator Valves

Described on Page C5

Each Radiator shall be equipped with a No.—(give number of valve) Arco Packless Steam Radiator Valve manufactured by American Radiator Company.

FOR VAPOR HEATING

Arco Packless Fractional Valve

Described on Page C6

Each Radiator shall be equipped with a No.—(give number of valve) Arco Packless Fractional Valve manufactured by American Radiator Company.

FOR HOT WATER HEATING

Arco Packless Water Radiator Valve

Described on Page C7

Each Radiator shall be equipped with a No. 901 Arco Packless Hot Water Radiator Valve manufactured by American Radiator Company.

AIR VALVES FOR LOW PRESSURE STEAM JOBS

In-Airid Air Valve No. 1

Described on Page C18

Each Radiator shall be equipped with No. 1 In-Airid Air Valve manufactured by American Radiator Company.

No. 821 Ideal Float Quick Vent

Described on page C26

Install where shown on the plans on each steam return a No. 821 Ideal Float Quick Vent manufactured by American Radiator Company.

IDEAL ACCESSORIES FOR VACUUM STEAM JOBS

In-Airid Air Valve No. 2

Described on Page C19

Each Radiator shall be equipped with a No. 2 In-Airid Air Valve manufactured by American Radiator Company.

Arco Packless Steam Radiator Valves

Described on Page C5

Each Radiator shall be equipped with a No.—(give number of valve) Arco Packless Steam Radiator Valve manufactured by American Radiator Company.

No. 822 Ideal Vac-Vent

Described on Page C27

Install where shown on plans on each steam return a No. 822 Ideal Vac-Vent manufactured by American Radiator Company.

Arco Packless Water Gauge

Described on Page C16

Install on boiler one No. 351 Arco Packless Water Gauge manufactured by American Radiator Company.

SPECIFICATION FORMS — Continued

IDEAL Air Line Valve

Described on Page C25

FOR VENTING STEAM RADIATORS WHERE AIR LINE OR DRIP LINE IS USED

Each radiator shall be equipped with a No. 816 IDEAL Air Line Valve, manufactured by the American Radiator Company.

IDEAL Vento Vent

Described on Page C25

FOR VENTING VENTO STACKS AND BLAST COILS

Install on each Vento Stack (or Blast Coil) and connect to drain by ¼ inch pipe, a No. 817 IDEAL Vento Vent, manufactured by the American Radiator Company.

ARCO Water Regulator

Described on Pages C30 and C32

FOR DAMPER CONTROL ON HOT WATER HEATING BOILERS

Install on the Hot Water Heating Boiler and properly connect to dampers a No. 800 ARCO Water Regulator, manufactured by the American Radiator Company.

FOR DAMPER CONTROL ON HOT WATER SUPPLY BOILERS

Install on the Hot Water Supply Boiler and properly connect to dampers, a No. 801 ARCO Junior Water Regulator, manufactured by the American Radiator Company.

ARCO Tank Regulator

Described on Page C37

FOR TEMPERATURE CONTROL OF HOT WATER STORAGE TANKS
HEATED BY STEAM

Install on the hot water storage tank a No.—(specify number of style desired) ARCO Tank Regulator, manufactured by the American Radiator Company. The regulator to be the size——(specify size) and to have a temperature range of —— degrees to —— degrees (specify range desired).

JEWELL Temperature Regulator

Described on Page C46

FOR ROOM TEMPERATURE CONTROL

Install a No.—(specify number of model) JEWELL Temperature Regulator with thermostat located in room (specify room) and make proper connections to dampers of heater.

External Water Heaters

Described on Page C50

FOR HEATING DOMESTIC WATER SUPPLY FROM STEAM OR VAPOR BOILER

Install below the water line of the boiler and properly connect to the water tank a No.—(specify size of heater desired) Excelso Water Heater.

IDEAL ASBESTOS CEMENT

STOCK No. 402

Ideal Asbestos should be applied to a warm surface in thin coats; the first coat should be left a rough surface and allowed to dry. Mix with water and apply with a trowel, finishing with a wet brush. When dry give a coat of paint; or when applying last coat, mix Asbestos half and half with Portland Cement; final coat should be about 1/8 inch thick, with a very hard finish.

Amount of Cement required to cover Ideal Boilers 1¼ inches thick:

IDEAL WATER TUBE, SMOKELESS AND OIL BURNING BOILERS

STEAM AND WATER

No. of Sections	LBS. OF ASBESTOS CEMENT REQUIRED TO COVER														
	23″			29″			36″			48″			79″		
	Sides and Top	Front and Back	Total	Sides and Top	Front and Back	Total	Sides and Top	Front and Back	Total	Sides and Top	Front and Back	Total	Sides and Top	Front and Back	Total
5	100	Not Covered	100	175	Not Covered	175									
6	125		125	200		200	250	125	375						
7	150		150	250		250	300	125	425	600	200	800			
8	175		175	300		300	325	125	450	675	200	875			
9	200		200	325		325	375	125	500	775	200	975	600	450	1050
10	225		225	375		375	425	125	550	875	200	1075	650	450	1100
11	250		250	425		425	450	125	575	950	200	1150	725	450	1175
12	275		275	450		450	500	125	625	1050	200	1250	800	450	1250
13	300		300	500		500	550	125	675	1150	200	1350	850	450	1300
14	325		325	550		550	575	125	700	1225	200	1425	925	450	1375
15							625	125	750				1000	450	1450
16													1050	450	1500
17													1125	450	1575

IDEAL ARCO ROUND BOILER—STEAM AND WATER

No. of Boiler	Lbs.	No. of Boiler	Lbs.
1704	100	2204	150
1705	125	2205	175
1706	150	2206	200
1904	125	2504	175
1905	150	2505	200
1906	175	2506	225
2004	125	2804	200
2005	150	2805	225
2006	175	2806	250

ARCO METAL

PIPE

ARCO METAL

PIPE

ARCO · ARCO · ARCO · ARCO · ARCO · ARCO · ARCO · ARCO ·
ARCO

ARCO METAL Pipe is a threaded joint, corrosion-resisting, high quality cast pipe made of superior alloy iron.

It is made in the following sizes: 1½ inch, 2 inch, 2½ inch, 3 inch, 4 inch, 5 inch and 6 inch with the same outside and inside diameters as extra strong wrought steel or iron pipe. (8 inch, 10 inch and 12 inch will be available later.)

It can be cut and threaded at any point within its own length with all standard tools which are used on wrought steel or iron pipe and does not have to be reamed after cutting.

Each length is tested by hydrostatic pressure, the test ranging from 300 to 1000 pounds per square inch.

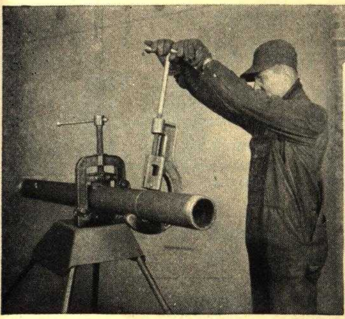
It is true to dimensions, smooth outside and inside.

It is free from casting strains.

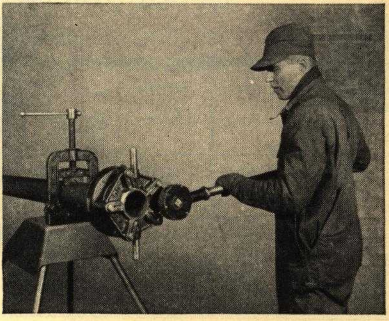
It is uniform in wall thickness.

All standard flow tables for extra strong wrought steel and iron pipe can be used to figure the capacity of Arco Metal Pipe.

Above all, it is very resistant to both corrosion and erosion and will not scale inside, cutting down the flow area.



Cutting Arco Metal *Pipe*



Threading Arco Metal *Pipe*

CUTTING, THREADING AND WELDING
ARCO METAL
PIPE

ARCO METAL Pipe can be cut and threaded at any point within its own length with hand or power tools. No reaming necessary after cutting. It is flexible in its ability to be worked up for any job. It withstands expansion and contraction and is light in weight.

Heretofore the welding of cast iron pipe has been by the bronze braising method. This establishes a bi-metal condition in the line, exposing it to the action of electrolysis. After considerable research an Arco Metal welded joint has been developed for Arco Metal Pipe. This is made possible by the close grain structure and superior strength of the material in the pipe. This is of particular importance to the oil industry and all manner of industrial plants. Laboratory tests have proved that the weld is as strong, if not stronger, than the pipe.

Distinctive Marking of Arco Metal Pipe

Arco Metal Pipe, Couplings and Nipples can be readily distinguished by the "Arco" red surface with the black stripe on one side and the name "Arco" in black on the other, as shown on the preceding page. This distinctive marking makes it easily identified at all times and prevents substitutes so that the customer is assured a complete Arco Metal Pipe line throughout.

ARCO METAL PIPE

EXTRA STRONG—THREADED

LIST PRICES—DIMENSIONS—WEIGHTS

Sizes in Inches	List Price Per Foot	Weight per Foot	Diameters		Wall Thickness Inches	Threads per Inch	Feet per Ton
			External Inches	Internal Inches			
1½	$ .35	3.5	1.900	1.500	.200	11½	571.0
2	.47	4.7	2.375	1.939	.218	11½	425.5
2½	.67	6.7	2.875	2.323	.276	8	298.5
3	.92	9.2	3.500	2.900	.300	8	217.0
4	1.30	13.0	4.500	3.826	.337	8	153.8
5	1.84	18.4	5.563	4.813	.375	8	108.6
6	2.68	26.8	6.625	5.761	.432	8	74.5

Discounts to the Trade. Secure Your Prices from Your Jobber.

All weights and dimensions are nominal.

Arco Metal Pipe in sizes 1½″ to 6″ is made in lengths of approximately six feet and is regularly shipped loose, threaded each end with protectors. Sizes larger than six inch will be available at a later date.

Plain end pipe can be furnished from plant when so ordered.

Arco Metal Standard Coupling

Arco Metal Drainage Coupling

ARCO METAL COUPLINGS—Right Hand

LIST PRICES—DIMENSIONS—WEIGHTS

STANDARD					DRAINAGE				
Size Inches	List Price	Weight Per 100	O. D. Inches	Length Inches	Size Inches	List Price	Weight Per 100	O. D. Inches	Length Inches
1½	$ .15	100	2½	2⅛	1½	$ .18	130	2½	2⅛
2	.24	162	3	2½	2	.25	180	3	2½
2½	.35	250	3⅝	2 13/16	2½	.50	360	3⅝	3⅝
3	.55	380	4¼	3⅛	3	.65	460	4¼	3⅝
4	1.05	790	5½	4½	4	1.20	910	5½	4½
5	1.64	1310	6¾	5	5	1.90	1440	6¾	5
6	2.46	1850	8	5½	6	2.85	2140	8	5½

Discounts to the Trade. Secure Your Prices from Your Jobber.

ARCO METAL NIPPLES—Right Hand

Arco Metal Short Nipple

Arco Metal Long Nipple

List Prices, Sizes and Lengths Kept in Stock

Size	Close	Short	Long				List Price Each	
							Close or Short	Long
1½	1¾	2½	3	3½	4	4½	$ .26	$ .40
2	2	2½	3	3½	4	4½	.36	.54
2½	2½	3	3½	4	4½	5	.78	1.18
3	2⅝	3	3½	4	4½	5	.96	1.44
4	2⅞	4	4½	5	5½	6	1.70	2.40
5	3	4½	5	5½	6	6½	3.10	4.90
6	3⅛	4½	5	5½	6	6½	3.70	5.80

EXTRA LONG NIPPLES

List Price Each

Length, Inches

Size	5	6	7	8	9	10	11	12
1½	$ .50	$ .58	$ .72	$ .80	$ .90	$1.00	$1.08	$1.18
2	.64	.76	1.00	1.08	1.18	1.30	1.44	1.54
2½	.....	1.36	1.80	1.94	2.12	2.34	2.52	2.70
3	.....	1.70	2.16	2.40	2.66	2.90	3.16	3.40
4	.....	.....	3.04	3.38	3.74	4.10	4.44	4.80
5	.....	.....	5.16	5.66	6.20	6.70	7.20	7.70
6	.....	.....	6.10	6.70	7.40	8.00	8.60	9.30

Discounts to the Trade. Secure Your Prices from Your Jobber.

ARCO METAL PIPE DATA

DESCRIPTION	SIZES						
	1½″	2″	2½″	3″	4″	5″	6″
Actual Outside Diameter	1.900	2.375	2.875	3.500	4.500	5.563	6.625
Actual Inside Diameter	1.500	1.939	2.323	2.900	3.826	4.813	5.761
Wall Thickness	.200	.218	.276	.300	.337	.375	.432
Actual Outside Circumference	5.97	7.46	9.03	11.00	14.14	17.48	20.81
Actual Inside Circumference	4.69	6.07	7.27	9.09	12.00	15.12	18.07
Weight per Foot Threaded Ends—Nominal	3.5	4.7	6.7	9.2	13.0	18.4	26.8
Number of Feet per Ton—Nominal	571.0	425.5	298.5	217.0	153.8	108.6	74.5
Square Inches Outside Area—Transverse	2.84	4.43	6.49	9.62	15.90	24.31	34.47
Square Inches Inside Area—Transverse	1.75	2.94	4.21	6.57	11.45	18.19	25.98
Square Inches Area of Metal—Transverse	1.08	1.50	2.28	3.05	4.46	6.11	8.50
Number of Square Feet of Outside Radiation Surface per Lineal Foot of Pipe	.497	.622	.752	.916	1.178	1.456	1.734
Length of Pipe in Feet per Square Foot of Outside Radiating Surface	2.01	1.608	1.329	1.091	.849	.687	.577
Number of Threads per Inch of Screw	11½	11½	8	8	8	8	8
Number of Perfect Threads	6.32	6.69	7.10	7.60	8.4	9.25	10.10
Total Length of Thread and Taper at Top	.984	1.019	1.512	1.575	1.075	1.781	1.887
Length of Perfect Thread	.549	.582	.887	.950	1.05	1.156	1.262
Depth of Thread	.069	.069	.100	.100	.100	.100	.100
Outside Diameter of Thread at End of Pipe	1.865	2.338	2.819	3.440	4.434	5.490	6.546
Root Diameter of Thread at End of Pipe	1.726	2.199	2.619	3.240	4.234	5.290	6.346
Taper of Thread per Inch of Screw	1/32	1/32	1/32	1/32	1/32	1/32	1/32

TRADE NOTES

Arco Metal Pipe in sizes 1½″ to 6″ inclusive is made in lengths of approximately six feet, and is regularly shipped loose, threaded each end with thread protectors.

Plain end pipe can be furnished from plant when so ordered.

Lengths longer than six feet can be furnished in all sizes by the use of a cast iron weld of the same material used in the pipe. This weld is guaranteed to have as great strength and as long life as the rest of the pipe. Every weld is carefully tested and inspected before shipment.

Couplings are not furnished with pipe but must be ordered separately as fittings.

On orders that specify quantity of pipe desired in feet, or in number of lengths, it is understood that random lengths of approximately six feet each will be shipped and the actual total measurement, in feet and inches, charged for.

For cut lengths an extra charge will be made above random lengths.

All threads are American standard (Briggs) checked to working gauges.

All Arco Metal Pipe weights and dimensions are nominal.

Each length of pipe is tested by hydrostatic pressure before shipment from plants. Standard test 300 pounds. Special high pressure test on request.

ARCO METAL

PIPE

Has already proved its superiority and practicability for the following uses:

These are a few of the services where ARCO METAL Pipe will cut maintenance cost and increase the life of piping systems.

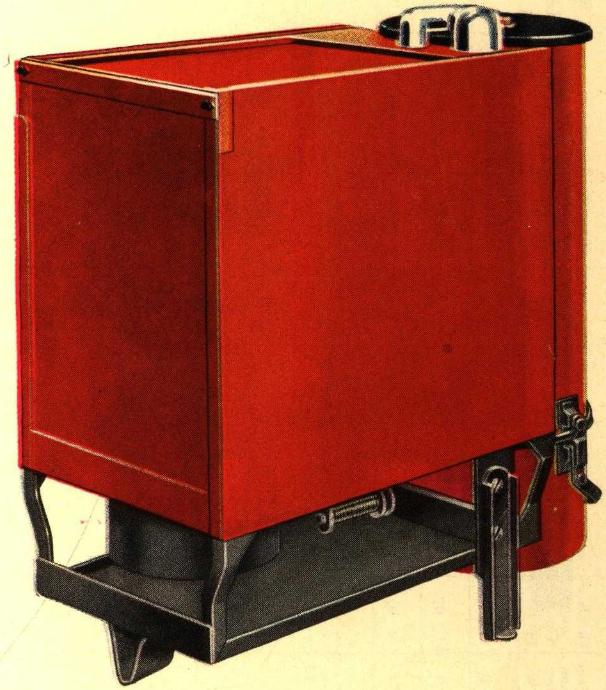
Heating condensation lines
Plumbing soil waste and vent lines
Oil refineries
Buried lines in cinder fills and corrosive soils
Submerged lines in salt water
Chemical process manufacturing lines
Industrial waste lines
Power plants
Creameries
Paper mills
Mine water lines
Industrial water supplies
Water and gas service lines
Water and gas mains
Salt water lines
Refrigeration
By-product coke plants
Dry-kilns
Filtration plants
Golf course water supply
Greenhouse heating systems
Sprinkler systems
All buried lines

The uses for ARCO METAL Pipe are so varied that no attempt will be made to describe them here. We invite you to write us for information about the particular installation or use you have in mind.

ARCO METAL Pipe, in quantities desired for any installation will be sold and distributed through wholesalers of Plumbing and Heating supplies who will carry it in stock to serve the trade.

ARCO WAND
VACUUM CLEANERS

ARCO WAND VACUUM CLEANERS



Model No. 675 Stationary
¾ Horsepower

See next page for complete list
and condensed specifications
of all models

ARCO WAND VACUUM CLEANERS

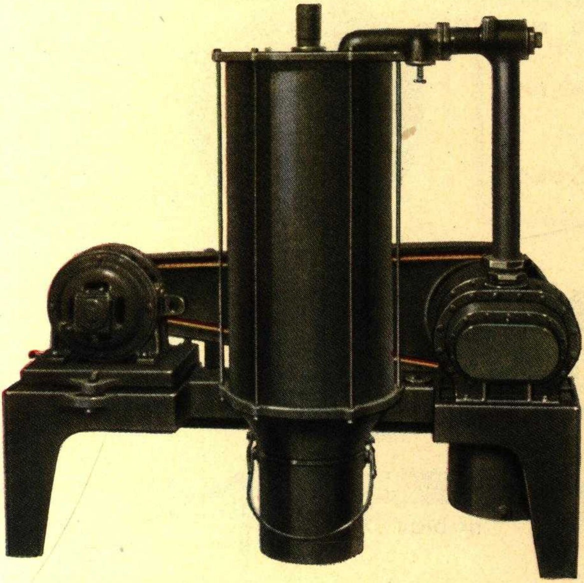
MODELS AND CONDENSED SPECIFICATIONS

Model No.	Type	Horse-power	Vac-uum In. Hg.	Displace-ment Cu. In. per Rev.	Pump Speed R.P.M.	Length In.	Height In.	Width In.	Capacity of Dust Bucket Cu. In.	Color	Shipping Weight (Approx.) Lbs.	Replaces Former Model
1	Portable Cabinet	½	4.5	97	900	43	38	17½	1130	Sage green	410	341-T 305-T
2	Portable-Industrial	½	4.5	97	900	43	38	17½	1130	Sage green	410	341-T 305-T
3	Stationary	½	4.5	97	900	43	38	17½	1130	Sage green	375	135; 341; 305
4	Portable Cabinet	1	6	97	1150	43	38	17½	1130	Sage green	430	361-T 306-T
475	Portable Cabinet	¾	5.75	97	1100	43	38	17½	1130	Red and Black	420	None
5	Portable-Industrial	1	6	97	1150	43	38	17½	1130	Sage green	430	361-T 306-T
6	Stationary	1	6	97	1150	43	38	17½	1130	Sage green	410	361 306
675	Stationary	¾	5.75	97	1100	43	38	17½	1130	Red and Black	400	351
7	Stationary	2	8	356	500	58	58	24	735	Sage green	850	462 481
8	Heavy Duty Portable-Industrial	2	8	356	500	58	62	27	735	Sage green	1100	481-T
9	Railroad (Portable)	2	8	356	500	58	62	27	735	Sage green	1300	465 485

For details and prices see Arco Vacuum Corporation General Catalog, which may be had from nearest American Radiator Co. branch, or from Arco Vacuum Corporation, 40 West 40th St., New York, N. Y.

ALL MODELS LISTED ABOVE ARE SINGLE SWEEPER

ARCO WAND VACUUM CLEANERS



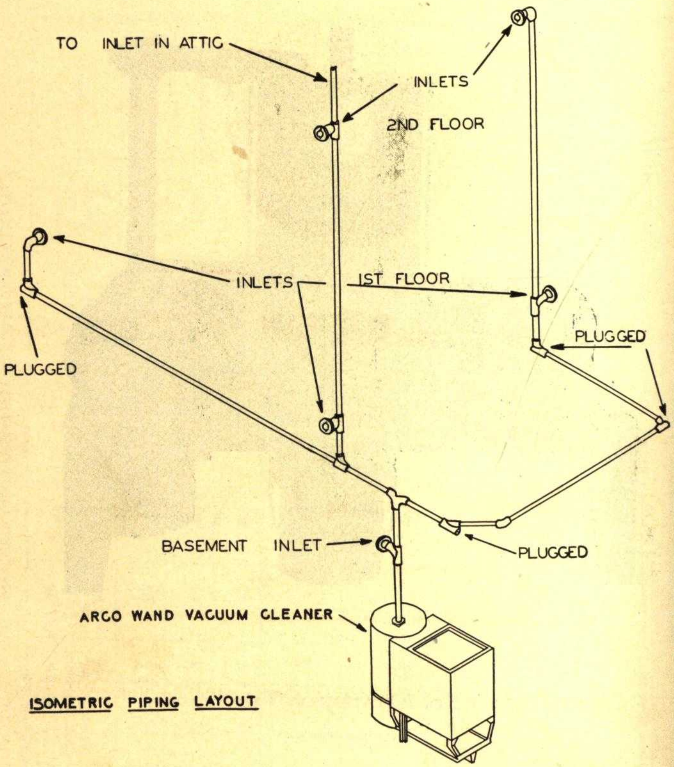
No. 7 Stationary Type

Two Horsepower

See opposite page for complete list and condensed specifications of all models.

Details and prices in Arco Vacuum General Catalog, obtainable from nearest American Radiator Company branch, or Arco Vacuum Corporation, 40 West 40th St., New York, N. Y.

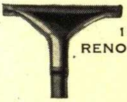
ARCO WAND VACUUM CLEANERS



ISOMETRIC PIPING LAYOUT

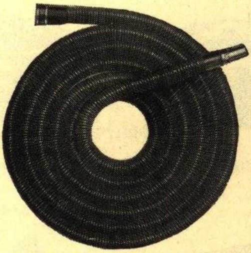
Detailed Installation instructions are contained in Installation Data folder obtainable from nearest Branch or from Arco Vacuum Corporation, 40 W. 40th St., New York, N. Y.

ARCO WAND VACUUM CLEANERS


10″ RENOVATOR

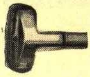
4″ RENOVATOR

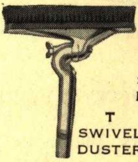
TUFT CLEANER


FLEXIBLE CONVOLUTE HOSE

How
to Order
See
Next Page

5″ HAND BRUSH


6″ HAND BRUSH


T SWIVEL DUSTER

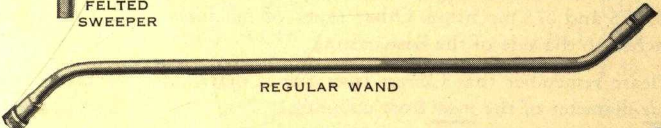
ROUND SWIVEL DUSTER

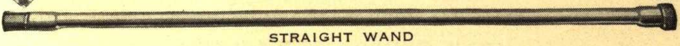
12″ FLOOR BRUSH

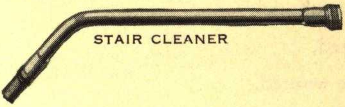
12″ FELTED SWEEPER

RADIATOR TOOL

RADIATOR FLOOR CLEANER


REGULAR WAND

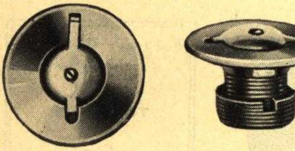

STRAIGHT WAND


STAIR CLEANER

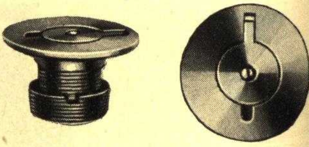
ARCO WAND TOOLS

ARCO WAND VACUUM CLEANERS

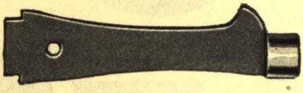
INSTALLATION ACCESSORIES



Wall Type Inlet Coupling



Floor Type Inlet Coupling



Inlet Coupling Wrench

HOW TO ORDER

When ordering repair parts, please be sure to state Model and Serial Number of Cleaner for which repair parts are wanted.

These numbers are shown on Arco Wand nameplate, which will be found on top of the separator cover on the 305, 305-T, 306 and 306-T, Nos. 1, 2, 3, 4, 5, 6, 475 and 675 machines. Other types of machines have the nameplate attached to the side of the base casting.

Please remember that *Correct Hose Size* is determined by measuring the *inside* diameter of the *male* hose coupling.

HOSE ORDERS SHOULD SHOW

1—Hose size (see above).

2—Length wanted.

3—Style of hose wanted.

4—Whether with or without couplings.

For stock lengths and styles of hose and for details and prices of tools and parts, see Arco Vacuum General Catalog or Parts Price List, obtainable from nearest branch of American Radiator Company or from Arco Vacuum Corporation, 40 W. 40th St., New York, N. Y.

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FAMILIAR HEATING TERMS

What They Mean

Actual Evaporation.—By this term is meant the total quantity of water (in pounds) evaporated from any temperature of feed water into steam at any pressure. The heat used per pound depends on the feed water temperature and the pressure and temperature at which the steam is made.

Atmospheric Pressure.—This is the pressure due to the weight of the atmosphere. It is generally expressed in pounds per square inch or in inches of mercury column. To find the pressure in pounds per square inch, when expressed in inches of mercury column, multiply the latter by .491, which is accurate for mercury at 70° and near enough for most calculations for other temperatures.

Normal atmospheric pressure is 14.7 pounds per square inch.

The average atmospheric pressure for any locality depends on the altitude above sea-level.

Absolute Pressure.—The sum of the gauge and atmospheric pressure is called the absolute pressure.

Boiler Heating Surface (Direct).—That surface which receives the radiant heat of the fire, or that surface on which the fire shines.

Boiler Heating Surface (Indirect Flue).—That surface on which the fire does not shine, but with which the hot gases come in contact before reaching the smokehood.

The value of indirect surface depends on its position; on the velocity of gas particles over it; on the contact of the gas particles with it; on its cleanliness, or the ease with which it can be cleaned, and many other factors. Consequently, it is not possible to compare two boilers merely on heating surface.

B.t.u. (British Thermal Unit).—The quantity of heat required to raise 1 pound of water 1 degree Fahrenheit.

Calorie.—The Continental heat unit, or calorie, is the quantity of heat required to raise the temperature of 1 kilogram of water 1 degree Centigrade, and as 1 kilogram is equal to 2.205 pounds and 1 degree Centigrade is equal to 1.8 degrees Fahrenheit, it is obvious that one calorie measures the same quantity of heat as does 3.969 B.t.u. This is shown by multiplying 1.8 by 2.205.

Calorific Value (Heat Value).—The heat in B.t.u. generated by the complete combustion of 1 pound of a solid or liquid fuel or 1 cubic foot of gaseous fuel at standard pressure and temperature.

For fuels containing hydrogen, two heat values may be found, the higher and the lower.

The higher or gross heat value is the heat obtained from complete combustion when the water vapor formed is condensed and thereby gives up its latent heat.

The lower or net heat value is the heat obtained when the water vapor formed during combustion escapes without condensing.

Calorimeter.—An apparatus for measuring quantities of heat.

Calorimeter, Bomb.—Used to determine the calorific value of a solid or liquid fuel.

A small weighed quantity of the fuel is placed in a cup in a closed shell filled with oxygen under pressure. By means of an electric spark or electrically heated wire the fuel is ignited. The heat generated by the fuel in burning is given to the water surrounding the "bomb." By knowing the weight of water, the temperature rise, the heat absorbed by the calorimeter and the heat lost by radiation, the heat generated by the fuel can be computed.

The heat value is generally determined for a sample from which the moisture has been removed by heating.

Calorimeter, Junkers.—Used to find the heat value of a gas. The gas is burned in a shell surrounded by circulating water. The water completely absorbs the heat given up by the gas. By measuring the gas at standard conditions and determining the quantity and temperature rise of the water, the heat given up by the gas or its heat value can be computed.

Clinker.—Clinker is slag caused by the fusing or melting together of the constituents of the ash. The extent to which fuel clinkers depends on the composition of the ash as well as the temperature at which it melts.

CO.—Symbol for carbon monoxide which denotes incomplete combustion of the carbon in the fuel.

CO_2.—Symbol for Carbon Dioxide, which is the result of complete combustion of the carbon in the fuel.

Coal, Caking.—Coal which fuses and becomes a pasty mass when heated, as opposed to free burning (non-caking coal).

Coal, Free-Burning (non-caking).—Coal which does not fuse together and become a pasty mass when heated, but burns freely.

Combustion Chamber.—A space provided to permit the combustion of gases or vapors.

Combustion, Rate of.—The number of pounds of coal burned per square foot of grate per hour.

Condensation.—The change of a substance from a vapor into a liquid state due to cooling.

Condensing, Power of Radiation.—The number of pounds of equivalent evaporation condensed by 1 square foot of radiation per hour for standard conditions.

Conduction.—By conduction is meant the flow of heat through an unequally heated body, or system of bodies, from points of higher to points of lower temperature.

Convection.—By convection heat is transferred by the bodily movement of heated particles of matter—such as carried by circulation of a liquid or a gas.

Efficiency of a Boiler.—Is the ratio expressed in per cent of the heat absorbed per pound of dry coal burned, to the heating value of a pound of dry coal fired.

Equivalent Evaporation from and at 212° F.—Is meant the number of pounds of water that would be evaporated from a feedwater temperature of 212° F. into dry and saturated steam at 212° F. by the expenditure of the same amount of heat as is actually used in evaporating the water under other conditions.

To find the equivalent evaporation if steam is not generated under the above conditions, compute the total heat used and divide by 970.4.

Evaporation.—Is the process of transforming a substance from the liquid state into the gaseous state.

Evaporation Power.—The number of pounds of equivalent evaporation a boiler will evaporate from 1 pound of dry fuel burned.

Fuel Capacity (total).—The total fuel capacity represents the total weight of fuel that may normally be fed to the boiler at one time.

Fuel Capacity (available).—This usually represents 75 per cent of the total fuel capacity. This factor is not a constant, however, but varies with the type of boiler and fuel used.

Heating Surface.—All surfaces of a boiler which have hot gases on one side and steam or water on the other.

Heat Transmission.—The passage of heat through any substance from a medium on one side of the substance to a medium of lower temperature on the other side. For example: from the steam in a radiator to the air in the room through the radiator.

Heat Transmission, Co-efficient of.—The number of B.t.u. passing through 1 square foot of surface, in 1 hour, per degree difference in temperature of the gases or liquids on the two sides of the surface.

Ignition Temperature.—The temperature to which a combustible must be raised to cause a rapid chemical union with oxygen.

Latent Heat.—That heat which changes the physical state of a substance without changing its temperature.

Latent Heat of Fusion.—The heat required to change a substance from a solid into a liquid state at the melting point.

Latent Heat of Evaporation.—The heat required to change a substance from a liquid to a vapor at the boiling point.

In speaking of steam, the term Latent Heat means the latent heat of evaporation.

Potential Energy.—Potential energy in speaking of boilers and hot water heaters has been used to denote the total amount of heat received by the water from charge of available fuel.

Radiation.—The transfer of energy in space by means of heat waves. The earth is heated by radiation from the sun.

Steam is water vapor.

Saturated Steam is water vapor at the temperature of the boiling point corresponding to pressure.

Wet Steam is saturated steam which contains entrained moisture.

Boiler Horsepower

One Boiler horsepower is defined as the evaporation of 34½ pounds of water per hour from a feed water temperature of 212 degrees into steam at 212 degrees. This is equal to 34.5x970.4=33478.8 B.t.u. per hour.

One Boiler horsepower is equal therefore to

$\frac{33478.8}{240}$=139 square feet of steam radiation.

Note that Boiler horsepower is not derived from engine horsepower.

1 horsepower hour=2545 B.t.u.

Miscellaneous Rules

To find the B.t.u. output per hour of a steam boiler, multiply the output in square feet by 240.

To find the B.t.u. output per hour of a water boiler, multiply the output in square feet by 150.

To find the output in square feet of steam radiation; divide the output in B.t.u. per hour by 240.

To find the output in square feet of water radiation; divide the output in B.t.u. per hour by 150.

The following example illustrates the manner of computing the heat required to make a pound of steam under any conditions:

Problem.—Compute the quantity of heat required to change 1 pound of ice at 40 degrees below zero into steam at 7.05 pound gauge pressure with 80 degrees superheat when the atmospheric pressure is 11.86 pounds per square inch.

Solution.—The absolute pressure equals 7.05+11.86=18.91 pounds per square inch. At 18.91 pounds boiling point equals 225 degrees Fahrenheit (see properties of saturated steam, page F65). Latent heat equals 962 B.t.u.

To raise 1 pound ice 1 degree Fahrenheit requires 0.5 B.t.u.

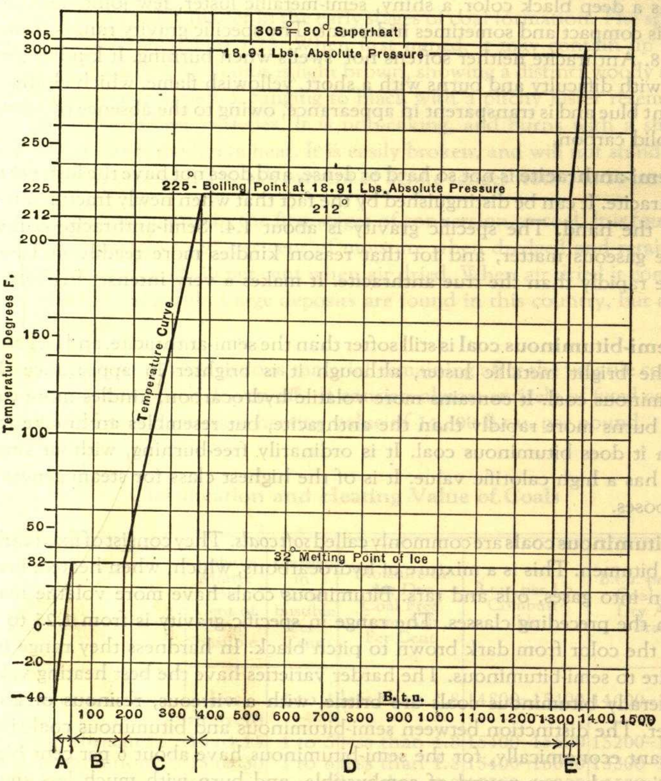
To raise 1 pound water 1 degree Fahrenheit requires 1.0 B.t.u.

To raise 1 pound steam 1 degree Fahrenheit requires 0.48 B.t.u.

To melt 1 pound ice at 32 degrees Fahrenheit requires 142.6 B.t.u.

		B.t.u.
Heat to raise temperature of ice to M.P.	= 72×0.5 =	36.
Heat to melt ice at M.P.	=	142.6
Heat to raise temperature of water to B.P.	=	193.1
Heat to evaporate water at B.P.	=	962.
Heat to superheat steam 80 degrees	= 80×.48 =	38.4
Total Heat required...........................		1372.1

The problem is represented graphically in the diagram below from which a mental picture can be made of the various steps possible in the making of a pound of steam.



A = B.t.u. to raise temperature to melting point.
B = B.t.u. to melt ice at melting point.
C = B.t.u. to raise temperature to boiling point.
D = B.t.u. to evaporate water at boiling point.
E = B.t.u. to raise temperature to 80 deg. superheat.

NAMES AND SIZES OF COAL

Anthracite

Anthracite is almost always sized, that is, screened. The commercial names of different sizes of coals are given in the following table. The coal of a stated size will pass through the larger openings and over the smaller openings in a metal screen.

Trade Name	Standard Square Mechanical Screen, Size of Holes in Ins.	
	Passes Through	Passes Over
Broken	4	2¾
Egg	2¾	2
Stove	2	1⅜
Chestnut	1⅜	¾
Pea	¾	½
No. 1 Buckwheat	½	¼
No. 2 Buckwheat (Rice)	¼	⅛
No. 3 Buckwheat (Barley)	⅛	1/16
Culin		Residue from Screening

Bituminous

There is no classification of sizes of bituminous coals which holds good in all localities. The American Society of Mechanical Engineers suggests the following:

Eastern Bituminous Coal

(a) Run-of-mine; unscreened coal taken from the mine.

(b) Lump; coal passing over 1¼-inch mesh bar screen.

(c) Nut; coal passing through a 1¼-inch bar screen, and over ¾-inch bar screen.

(d) Slack; coal passing through a ¾-inch bar screen.

Western Bituminous Coal

(a) Run-of-mine; unscreened coal taken from the mine.

(b) Lump; this group is divided in several different ways, 6-inch, 3-inch and 1¼-inch lumps, according to the diameter of the circular openings over which the respective grades pass. They are also grouped as 6 x 3 inch and 3 x 1¼ inch lumps. The coal passes through the larger opening, and over the smaller.

(c) Nut; this is also divided into different sizes, 3-inch steam nut passes through a 3-inch diameter opening, and over a 1¼-inch opening. 1¼ inch passes through a ¾-inch and over a ⅝-inch opening.

(d) Screening; coal passing through ¼-inch diameter opening.

Coke

Trade Name	Standard Square Mechanical Screen, Size of Holes in Ins.	
	Passes Through	Passes Over
Egg	3	2½
Large Stove	2½	2
Small Stove	2	1½
Nut	1½	¾
Pea	¾	½

COAL OF THE UNITED STATES

(Taken from *Bureau of Mines* Bulletins.)

(*) Indicates samples from car deliveries; all others are mine samples.

County Bed or Local Name	Proximate Analysis "As Received"				Heating Value B.t.u. per Lb.		Character of Coal See page 16
	Moisture	Volatile Matter	Fixed Carbon	Ash	"As Received"	Dry	
ALABAMA	%	%	%	%			
Bibb, Belle Ellen	3.16	31.05	59.56	6.23	14,141	14,602	B. C.
Jefferson, Dolomite	3.16	25.40	67.75	3.69	14,616	15,093	B. C.
Jefferson, Littleton	2.53	26.94	59.48	11.05	13,286	13,631	B. C.
St. Clair, Davis (Tillman Sta.)	3.39	30.69	57.08	8.84	13,363	13,832	B.
Shelby Straven	3.83	32.03	58.66	5.48	13,799	14,349	B.
Tuscaloosa, Abernant	2.62	24.18	64.11	9.09	13,729	14,098	B. C.
ALASKA							
Alaska Peninsula, Chignik Bay, Thompson Valley	10.77	30.37	43.99	14.87	9,641	10,805	Su. B.
Bering River, Hartline	4.75	13.72	63.13	18.22	10,820	11,360	B.
Cook Inlet, Port Graham	19.96	38.73	32.46	8.85	8,793	10,986	L.
Matanuska, Matanuska River	1.72	24.36	58.97	14.95	12,585	12,805	B.
Seward Peninsula, Chicago Creek	37.82	26.14	32.16	3.88			L.
ARIZONA							
Navajo, Oraibi	9.88	32.64	46.86	10.62	10,800	11,984	B.
ARKANSAS							
Logan, Paris	2.77	14.69	73.47	9.07	13,774	14,166	Se. B.
Pope, Russellville	2.07	9.81	78.82	9.30	13,702	13,992	Se. B.
Sebastian, Greenwood	3.21	14.84	72.66	9.29	13,588	14,039	B.
CALIFORNIA							
Monterey, Stone Canyon	6.95	46.69	40.13	6.23	12,447	13,377	B.
COLORADO							
Boulder, Lafayette	19.15	30.82	44.27	5.76	9,616	11,894	Su. B. F.
El Paso, Pikeview	26.20	29.67	37.67	6.46	8,352	11,317	Su. B. F.
Garfield, Newcastle	4.45	42.05	49.56	3.94	13,129	13,740	B.
Montezuma, Cortez	3.89	37.01	46.58	12.52	12,341	12,840	B.
Weld, Platteville	28.90	28.83	37.25	5.02	8,465	11,906	Su. B. F.
GEORGIA							
Chattooga, Menlo	3.80	15.88	65.83	14.49	12,791	13,296	B.

County Bed or Local Name	Proximate Analysis "As Received"				Heating Value B.t.u. per Lb.		Character of Coal See page 16
	Moisture	Volatile Matter	Fixed Carbon	Ash	"As Received"	Dry	
IDAHO	%	%	%	%			
Fremont, Haden	11.45	37.24	47.01	4.30	12,094	13,658	B.
ILLINOIS							
Clinton, *Germantown	11.35	34.62	40.63	13.40	10,733	12,107	B. F.
Franklin, Zeigler	11.82	27.66	55.10	5.42	11,961	13,564	B. F.
LaSalle, *Lasalle	12.39	36.89	41.80	8.92	11,399	13,011	B. F.
Macoupin, *Staunton	13.54	35.69	40.03	10.74	10,807	12,499	B. F.
Madison, Collinsville	12.70	36.36	41.47	9.47	10,989	12,588	B. F.
Marion, *Centralia	9.95	34.76	42.06	13.23	10,960	12,171	B. F.
Montgomery, Panama	13.31	33.62	41.34	11.73	10,548	12,167	B. F.
St. Clair, *Shiloh	11.69	35.70	39.42	13.19	10,699	12,115	B. F.
Saline, Harrisburg	6.01	32.37	54.32	7.30	12,793	13,611	B. F.
Sangamon, *Auburn	16.00	32.41	37.82	13.77	9,940	11,833	B.
Williamson, Carterville	9.18	27.30	55.40	8.12	12,015	13,229	B. F.
Williamson, Herrin	8.80	29.85	53.83	7.52	12,222	13,401	B. F.
INDIANA							
Clay, *Brazil	16.91	26.85	38.87	17.37	9,524	11,462	B. F.
Greene, *Linton	13.58	32.07	46.20	8.15	11,419	13,213	B.
Knox, *Bicknell	12.08	32.48	44.42	11.02	11,011	12,524	B.
Parke, *Rosedale	10.72	39.29	41.42	8.57	11,767	13,180	B. F.
Pike, *Littles	11.12	36.98	42.55	9.35	11,549	12,994	B.
Sullivan, Dugger	13.48	32.51	48.38	5.63	11,788	13,625	B. C.
Vigo, *Macksville	12.82	34.80	42.08	10.30	11,119	12,754	B. C.
Warrick, Elberfeld	9.69	38.59	41.04	10.68	11,412	12,636	B.
IOWA							
Appanoose, *Centerville	14.08	35.59	39.37	10.96	10,723	12,480	B.
Lucas, *Chariton	15.39	30.49	41.49	12.63	10,242	12,105	B.
Polk, *Altoona	13.88	36.94	35.17	14.01	10,244	11,895	B.
Wapello, *Laddsdale	8.24	30.74	45.02	16.00	11,027	12,017	B.
KANSAS							
Cherokee, *Seammon	2.50	33.80	51.25	12.45	12,900	13,230	B. C.
Crawford, Fuller	4.85	33.53	52.52	9.10	12,942	13,602	B. C.
Leavenworth, Lansing	11.10	35.51	40.69	12.70	11,065	12,447	B.
Linn, *Jewett	9.04	29.69	45.55	15.72	11,142	12,249	B. C.
KENTUCKY							
Johnson, Flambeau	2.36	48.40	38.75	10.49	13,770	14,103	B. F.
Muhlenberg, Central City	8.73	37.76	45.93	7.58	12,208	13,376	B. C.
Ohio, McHenry	9.89	35.94	43.36	10.81	11,392	12,642	B. C.
Pike, Hellier	3.73	30.01	59.42	6.84	13,649	14,178	B. C.
Webster, Wheatcroft	6.29	31.97	54.13	7.61	12,874	13,738	B. C.

County Bed or Local Name	Proximate Analysis "As Received"				Heating Value B.t.u. per Lb.		Character of Coal See page 16
	Moisture	Volatile Matter	Fixed Carbon	Ash	"As Received"	Dry	
MARYLAND	%	%	%	%			
Allegany, Eckhart	2.70	14.50	74.00	8.80	13,910	14,296	Se. B. C.
Allegany, Frostburg	3.20	14.50	75.60	6.70	14,100	14,566	Se. B.
Allegany, Lord	2.26	16.05	75.86	5.83	14,483	14,818	B.
Allegany, Midland	3.10	15.50	74.50	6.90	14,070	14,520	B.
Allegany, Washington	3.40	15.00	75.10	6.50	14,160	14,658	Se. B.
MICHIGAN							
Saginaw, Saginaw	11.91	31.50	49.75	6.84	11,781	13,374	B. F.
MISSOURI							
Adair, Kriksville	15.98	38.15	37.18	8.69	10,798	12,852	B.
Caldwell, Hamilton	10.99	35.00	41.37	12.64	11,093	12,463	B.
Henry, Windsor	13.51	33.24	41.88	11.37	10,779	12,463	B.
Lafayette, Napoleon	13.44	32.00	40.27	14.29	10,232	11,821	B.
Macon, Bevier	16.25	33.38	40.97	9.40	10,625	12,687	B.
Ray, Richmond	13.56	34.29	40.66	11.49	10,771	12,461	B.
MONTANA							
Carbon, Bear Creek	9.67	35.92	46.39	8.02	10,832	11,992	B.
Cascade, Geyser	8.67	25.72	50.36	15.16	10,127	11,088	B.
Custer, Miles	29.13	25.33	30.51	15.03	6,662	9,400	L.
Fergus, Lewistown	15.35	28.27	48.08	8.30	10,615	12,540	B.
Missoula, Missoula	24.70	29.33	26.11	19.80	6,727	8,934	L.
Yellowstone, Musselshell	16.66	27.85	48.07	7.42	10,226	12,274	L.
NEW MEXICO							
Colfax, Raton	2.12	36.06	50.22	11.60	12,965	13,246	B.
Lincoln, White Oaks	2.52	34.63	45.99	16.86	11,956	12,265	B.
M'Kinley, Blackrock	14.69	34.93	41.56	8.82	10,809	12,670	B.
NORTH DAKOTA							
Morton, Leith	36.18	29.77	25.35	8.70	6,700	10,498	L. F.
M'Lean, *Wilton	35.96	31.92	24.37	7.75	7,069	11,038	L. F.
Stark, *Lehigh	35.38	29.59	25.68	9.35	6,923	10,713	L. F.
Williams, *Williston	36.78	28.16	29.97	5.09	7,204	11,395	L. F.
OHIO							
Belmont, *Bellaire	4.14	39.30	47.18	9.38	12,874	13,430	B. C.
Guernsey, *Danford	6.65	33.94	48.86	10.55	12,179	13,047	B. C.
Jackson, *Wellston	7.71	38.32	42.02	11.95	11,515	12,477	B.
Jefferson, Amsterdam	3.50	37.98	51.08	7.44	13,286	13,768	B.
Noble, Belle Valley	5.15	37.34	49.00	8.51	12,733	13,424	B. C.
Perry, *Dixie	7.55	38.00	46.08	8.37	12,128	13,116	B.

County Bed or Local Name	Proximate Analysis "As Received"				Heating Value B.t.u. per Lb.		Character of Coal See page 16
	Moisture	Volatile Matter	Fixed Carbon	Ash	"As Received"	Dry	
OKLAHOMA	%	%	%	%			
Coal, Lehigh	7.07	36.41	45.68	10.84	11,468	12,340	B.
Haskell, McCurtain	2.70	21.07	69.88	6.35	14,098	14,489	B.
Pittsburg, Carbon	2.09	27.59	50.25	20.07	11,695	11,945	B.
Pittsburg, McAlester	3.58	32.11	59.04	5.27	13,615	14,121	B.
OREGON							
Coos, Beaver Hill	16.10	31.10	39.63	13.17	9,031	10,764	Su. B. F.
PENNSYLVANIA							
Allegheny, Bruceton	2.73	36.03	54.98	6.26	13,815	14,203	B. C.
Allegheny, Oak Station	3.48	35.15	55.45	5.92	13,700	14,194	B. C.
Allegheny, Scott Haven	2.60	32.67	59.41	5.32	14,085	14,461	B. C.
Bedford, Hopewell	1.58	16.32	69.98	12.12	13,408	13,623	B. C.
Cambria, Barnesboro	2.87	21.44	69.23	6.46	14,177	14,596	B. C.
Cambria, Beaverdale	3.44	16.18	73.46	6.92	14,114	14,617	B. C.
Cambria, Carrolltown Road	.93	23.10	69.29	6.68	14,485	14,621	B. C.
Cambria, Fallen Timber	3.34	24.06	62.75	9.85	13,618	14,089	B. C.
Cambria, Hastings	2.89	23.67	66.34	7.10	14,107	14,527	B.
Cambria, Johnstown	1.32	14.63	75.24	8.81	14,047	14,235	B. C.
Cambria, Nanty	2.84	19.78	70.89	6.49	14,285	14,703	B. C.
Cambria, Portage	3.52	17.32	73.27	5.89	14,278	14,799	B. C.
Cambria, St. Benedict	2.94	19.52	70.87	6.67	14,143	14,571	B. C.
Cambria, Van Ormer	2.73	24.98	63.64	8.65	13,860	14,249	B. C.
Cambria, Vintondale	3.63	18.63	71.20	6.54	14,119	14,651	B. C.
Cambria, Windber	3.30	12.50	77.90	6.33	14,340	14,829	B. C.
Center Osceola Mills	2.08	21.46	69.87	6.59	14,274	14,577	B. C.
Clarion, Blue Ball Station	1.90	22.00	66.30	9.80	13,760	14,027	B.
Clearfield, Boardman	2.95	21.29	66.92	8.84	13,901	14,324	B. C.
Clearfield, Philipsburg	.90	21.59	68.49	9.02	14,060	14,188	B. C.
Clearfield, Smoke Run	3.73	20.29	68.41	7.57	13,970	14,511	B. C.
Fayette, Connellsville	3.24	27.13	62.52	7.11	13,919	14,385	B. C.
Indiana, Clymer	2.06	24.46	66.09	7.39	14,170	14,468	B. C.
Indiana, Glen Campbell	3.08	27.32	61.16	8.44	13,772	14,210	B. C.
Jefferson, Sykesville	2.44	28.44	60.88	8.44	13,732	14,075	B. C.
Lackawanna, Dunmore	3.43	6.79	78.25	11.53	12,782	13,236	A. F.
Luzerne, Pittston	2.19	5.67	86.24	5.90	13,828	14,138	A. F.
Schuylkill, Minersville	2.76	2.48	82.07	12.69	12,577	12,934	A. F.
Schuylkill, Tower City	3.33	3.27	84.28	9.12	13,351	13,811	A. F.
Somerset, Jerome	1.44	15.21	73.38	9.97	13,799	14,001	B. C.
Somerset, MacDonaldton	1.03	16.03	72.57	10.37	13,700	13,843	B. C.
Somerset, Windber	2.40	13.50	77.80	6.31	14,370	14,723	B. C.
Sullivan, Lopez	3.16	8.59	78.08	10.17	13,376	13,812	B. C.
Washington, Marianna	1.44	34.61	57.77	6.18	14,242	14,450	B. C.
Westmoreland, Greensburg	2.14	30.02	58.81	9.03	13,662	13,961	B. C.

County Bed or Local Name	Proximate Analysis "As Received"				Heating Value B.t.u. per Lb.		Character of Coal See page 16
	Moisture	Volatile Matter	Fixed Carbon	Ash	"As Received"	Dry	
RHODE ISLAND	%	%	%	%			
Newport, Portsmouth	22.92	2.78	58.37	15.93	8,528	11,064	A. F.
Providence, Cranston	4.54	3.01	78.69	13.76	11,624	12,177	A. F.
SOUTH DAKOTA							
Perkins, Lodgepole	33.16	24.68	27.81	8.35	6,307	10,367	L. F.
TENNESSEE							
Anderson, Briceville	1.70	35.02	53.14	10.14	13,462	13,695	B.
Campbell, Lafollette	2.92	32.04	58.23	6.81	13,514	13,920	B.
Rhea, Dayton	1.76	27.86	49.57	20.81	11,666	11,875	B.
TEXAS							
Houston, Crockett	34.70	32.23	21.87	11.20	7,056	11,495	L. F.
Wood, Hoyt	33.71	29.25	29.76	7.28	7,348	11,085	L. F.
UTAH							
Carbon, Sunnyside	5.96	38.68	48.77	6.59	12,841	13,655	B. C.
Emery, Emery	3.93	40.92	49.22	5.93	12,965	13,495	B.
Iron, Cedar City	10.35	36.33	43.70	9.62	10,874	12,129	B.
Summit, Coalville	14.20	36.00	44.80	5.00	10,630	12,389	B.
VIRGINIA							
Henrico, Gayton	2.81	25.70	62.47	9.02	13,493	13,883	B.
Lee, Darbyville	3.42	34.36	58.83	3.39	14,134	14,634	B. C.
Russell, Dante	2.76	34.96	56.51	5.77	14,148	14,550	B. C.
Tazewell, Pocahontas	3.50	15.50	76.80	4.20	14,630	15,161	B. C.
Wise, Georgel	2.48	31.71	60.30	5.51	14,252	14,614	B. C.
WASHINGTON							
King, Black Diamond	7.98	37.69	45.95	8.38	11,732	12,749	B. F.
King, Cumberland	5.84	31.32	36.46	26.38	9,529	10,120	B. F.
Kittitas, Roslyn	3.89	37.00	46.49	12.62	12,434	12,937	B. C.
Pierce, Carbonado	3.81	26.60	49.33	20.26	11,518	11,974	B. C.
Thurston, Centralia	25.08	32.25	34.02	8.65	8,170	10,906	Su. B.
WEST VIRGINIA							
Fayette, Carlisle	4.95	18.16	73.75	3.14	14,434	15,186	B. C.
Fayette, Fayette	3.22	22.28	71.68	2.82	14,702	15,191	B. C.
Fayette, Hawks Nest	5.00	24.50	67.20	3.30	14,280	15,032	B. C.
Fayette, Kay Moor	3.17	25.11	68.81	2.91	14,584	15,061	B. C.
Fayette, MacDonald	3.22	17.53	76.46	2.79	14,760	15,251	B. C.
Fayette, Page	3.32	28.88	62.72	5.08	14,209	14,697	B. C.
Fayette, Sun	2.94	19.69	68.67	8.70	13,786	14,204	B. C.

County Bed or Local Name	Proximate Analysis "As Received"				Heating Value B.t.u. per Lb.		Character of Coal See note below
	Moisture	Volatile Matter	Fixed Carbon	Ash	"As Received"	Dry	
West Virginia (Cont'd)	%	%	%	%			
Logan, Holden	1.66	32.89	59.94	5.51	14,126	14,364	B. C.
M'Dowell, Ashland	2.80	14.50	77.40	5.33	14,550	14,969	Se. B. C.
M'Dowell, Big Four	2.30	16.98	76.21	4.51	14,636	14,981	B. C.
M'Dowell, Coalwood	2.19	13.91	75.25	8.65	13,995	14,308	Se. B. C.
M'Dowell, Eckman	3.32	16.22	76.35	4.11	14,587	15,088	B. C.
M'Dowell, Ennis	3.25	14.46	78.05	4.24	14,571	15,060	Se. B.
M'Dowell, Powhatan	2.55	13.44	78.57	5.44	14,569	14,950	Se. B.
M'Dowell, Roderfield	2.32	16.76	69.80	11.12	13,514	13,835	B. C.
M'Dowell, Worth	3.00	13.00	78.80	5.23	14,500	14,948	Se. B.
Marion, Monogah	2.95	35.01	56.44	5.60	13,862	14,283	B.
Mercer, Coaldale	3.43	14.58	77.89	4.10	14,602	15,121	Se. B.
Mercer, Wenonah	3.58	13.17	79.10	4.15	14,598	15,140	Se. B.
Monongalia, Richard	1.63	28.42	62.01	7.94	13,937	14,168	B. C.
Preston, Masontown	1.40	26.40	62.92	9.28	13,808	14,004	B. C.
Raleigh, Sophia	3.30	14.00	77.60	5.14	14,490	14,984	Se. B.
Raleigh, Stonewall	3.02	16.06	78.75	2.17	15,001	15,468	B. C.
Tucker, Thomas	1.12	20.74	70.38	7.76	13,800	13,956	B. C.
Wyoming							
Bighorn, Cody	17.29	31.33	45.89	5.49	10,055	12,157	Su. B.
Carbon, Hanna	11.45	42.58	39.33	6.64	10,890	12,298	B. F.
Fremont, Hudson	21.27	32.83	42.75	3.15	9,779	12,421	Su. B. F.
Hot Springs, Kirby	15.86	33.01	47.39	3.74	10,984	13,054	B.
Sweetwater, Superior	16.02	33.63	47.60	2.75	10,849	12,919	Su. B.
Sheridan, Monarch	23.88	34.33	38.44	3.35	9,335	12,264	Su. B. F.

*AF = Anthracite, free burning.
B = Bituminous.
B. C. = Bituminous Caking.
B. F. = Bituminous, free burning.
Su. B. = Sub-bituminous.
Su. B. F. = Sub-bituminous, free burning.
Se. B. = Semi-bituminous (smokeless).
Se. B. C. = Semi-bituminous, caking.
L. F. = Lignite, free burning.

CHARACTERISTICS OF WOOD AND COAL

COMPARATIVE HEATING VALUES OF WOOD AND OTHER SOLID FUELS (AIR DRIED)

L. P. Breckenridge

	B.t.u. per Pound	Weight Pounds per Cord	Pounds of 13500 B.t.u. Coal Equivalent to 1 Cord of Wood
Straw	5100		
Lignite	5200–7500		
Chestnut, Elm	5400	2350	940
Beech	5400	3250	1300
White Oak	5400	3850	1540
Hickory	5400	4500	1800
Cherry	5420	3140	1260
Ash	5450	3520	1420
Hard Maple, Walnut, Red Oak	5460	3310	1340
Live Oak	5460	3850	1560
Birch	5580	2880	1190
Tanbark	6100		
Hemlock	6410	1220	580
Yellow Pine, Poplar	6660	2130	1050
White Pine, Spruce, Willow	6830	1920	970
Pear, Air-dried	7500		
Corn	7200–8200		
Bagasse	8300		

WEIGHT OF ANTHRACITE COAL PER CUBIC FOOT

Grate	55.5 pounds
Egg	53.2 pounds
Stove	52.6 pounds
Nut	51.8 pounds
Pea	51.6 pounds
Buckwheat	49.2 pounds

OIL FUELS

Petroleum in its crude form is a mixture of a number of hydrocarbons, which can be separated by fractional distillation. While the raw product is sometimes used as fuel, the usual practice is to "top off" the more volatile gasoline, naphtha, kerosene and gas oil, not only conserving these valuable products, but reducing the fire hazard of the residual oil. Oils of the paraffin or saturated-base type, from the Appalachian range and Middle West, are dark brown in color, with a greenish tinge. The residuum from these usually contains such valuable lubricating stock as to preclude its use for fuel. The asphaltic base oils, from Texas, California and Mexico, run from reddish brown to black, and quantities of residuum from these are available because of the large market for the volatile distilled from them. The olefine-group oils, from Russia, are also suitable, and Panuco crude oil from Mexico retains so little volatile after handling and transportation as to be available without refining.

Fuel oils consist almost entirely of carbon and hydrogen, and their heating value depends on the amounts of these constituents by ultimate analysis, being little influenced by the composition or volatility of the compounds in which they exist. The principal factors determining the availability of a fuel oil are its price on a heat unit basis, its freedom from grit, acid, fibre and sulphur and the possession of a flash point over 150 degrees Fahrenheit and a viscosity that will enable it to be pumped at 60 degrees Fahrenheit.

Oil is sold by volume, on the basis of 42-gallon barrels, and as it averages 8 pounds per gallon, a barrel represents about 336 pounds. Investigation of its specific gravity is important in its purchase and sale. Commercially this is ascertained by a Baumé hydrometer, which is a standard, weighted, glass bulb with a graduated rod indicating the depth to which it sinks in the fluid under test.

FUEL OIL DATA

Degrees Baumé (Modul-lus 140)	Specific Gravity 60°–60° F.	Pounds per Gal.	Pounds per Bbl. of 42 Gal.	Pounds per Cu. Ft.	Cu. Ft. per Ton of 2240 lbs.	Gallons per Ton of 2240 lbs.	Barrels per Ton of 2240 lbs.
10	1.0000	8.328	349.78	62.298	35.96	268.97	6.40
11	.9929	8.269	347.30	61.856	36.21	270.89	6.45
12	.9859	8.211	344.86	61.422	36.47	272.81	6.49
13	.9790	8.153	342.43	60.989	36.73	274.75	6.54
14	.9722	8.096	240.03	60.562	36.99	276.68	6.59
15	.9655	8.041	337.72	60.151	37.24	278.57	6.63
16	.9589	7.986	335.41	59.739	37.50	280.49	6.68
17	.9524	7.931	333.10	59.328	37.75	282.44	6.72
18	.9459	7.877	330.83	58.924	38.01	284.37	6.77
19	.9396	7.825	328.65	58.535	38.27	286.26	6.82
20	.9333	7.772	326.42	58.138	38.52	288.21	6.86
21	.9272	7.721	324.28	57.757	38.78	290.19	6.91
22	.9211	7.670	322.14	57.375	39.04	292.05	6.95
23	.9150	7.62	320.04	57.001	39.30	293.96	6.99
24	.9091	7.57	317.94	56.627	39.56	295.91	7.04
25	.9032	7.522	315.92	56.268	39.82	297.79	7.09
26	.8974	7.473	313.87	55.902	40.07	299.77	7.13
27	.8917	7.425	311.85	55.543	40.33	301.68	7.18
28	.8861	7.378	309.88	55.191	40.58	303.61	7.23
29	.8805	7.332	307.94	54.847	40.84	305.51	7.27
30	.8750	7.286	306.01	54.503	41.10	307.44	7.32
35	.8485	7.065	296.73	52.850	42.38	317.06	7.55
40	.8235	6.857	287.99	51.294	43.67	326.67	7.77

Formula $\frac{140}{130+°\text{Be.}} = \text{Sp. Gr.}$

7.4805 Gallons = 1 Cubic Foot

Temperature corrections:

For each 18 degrees above 60 degrees Fahrenheit add 1 degree Be.
For each 18 degrees below 60 degrees Fahrenheit subtract 1 degree Be.

GASEOUS FUELS

The commercial gases usually encountered in American Heating Practice are:

Natural gas.
Mixed Natural and Manufactured Gas.
Manufactured Gas consisting of mixtures of
  Coal gas.
  Coke oven gas.
  Water gas.
  Carburetted water gas.
Producer gas.
Oil gas.

Characteristics, composition and combustion data relating to above gases are given in table on following page.

The important characteristics of any gas to the heating engineer are: heat value, specific gravity, and pressure at which gas is supplied, as these values are used in determining sizes of orifices (spuds) required to obtain the desired B.t.u. input to burners.

The size of orifice required for any burner may be computed by means of the formula:

$$A = \frac{I}{(C)\ (1658.5)\ K} \sqrt{\frac{d}{H}}$$

in which

A = area of orifice in square inches.
I = B.t.u. input to burner per hour.
C = heat value of gas in B.t.u. per cubic foot.
d = density of gas (air = 1).
H = pressure of gas at orifice in inches of water.
K = a coefficient which may be assumed to be 0.821 for sharp edged orifices as used in Ideal Gas Boilers.

COMPOSITION AND COMBUSTION DATA OF COMMERCIAL GASES

No.	Gas	Constituents of Gas—% by Volume							Illuminants		Specific Gravity Air = 1.000	Cu. Ft. of Air Required for Combustion of 1 Cu. Ft. of Gas	B.t.u. per Cu. Ft. Gross	B.t.u. per Cu. Ft. Net	Products of Combustion per Cu. Ft. of Gas				Ultimate CO_2 %	Net B.t.u. per Cu. Ft. of the Products of Combustion	Flame Temperature Corrected for Dissociation
		CO	CO_2	H_2	N_2	O_2	CH_4	C_2H_6	C_2H_4	C_6H_6					CO_2	H_2O	N_2	Total (Dry)			
1	Natural Gas Texarkana	....	0.80	....	3.20	....	96.00	.....	.....	.....	.57	9.17	967	873	.97	1.92	7.29	8.26	11.7	80.2	3580°
2	Natural Gas Cleveland	....	....	....	1.30	....	80.50	18.20	.....	.....	.65	10.70	1131	1025	1.17	2.16	8.50	9.67	12.1	81.1	3600°
3	Natural Gas Oil City, Pa.	....	....	....	1.10	....	67.60	31.30	.....	.....	.71	11.70	1232	1120	1.30	2.29	9.26	10.56	12.3	81.7	3620°
4	Retort Coal Gas, Horizontal	8.6	1.5	52.5	3.5	0.3	31.4	.....	1.1	1.1	.42	5.00	575	510	.50	1.21	3.99	4.49	11.2	83.5	3665°
5	Coke Oven Gas	6.3	1.8	53.0	3.4	0.2	31.6	.....	2.7	1.0	.42	5.19	588	521	.51	1.25	4.13	4.64	11.0	82.7	3660°
6	Coke Oven Gas Koppers Ovens	6.8	2.2	47.3	6.0	0.3	33.9	.....	2.6	.9	.44	5.23	591	525	.54	1.23	4.19	4.73	11.4	82.3	3650°
7	Carburetted Water Gas	33.4	3.9	34.6	7.9	0.9	10.4	.....	6.7	2.2	.65	5.37	536	596	.74	.75	3.54	4.28	17.2	88.5	3815°
8	Blue Water Gas	42.8	3.0	49.9	3.3	0.5	0.5	.....	.....	.....	.53	2.26	308	281	.46	.51	1.82	2.28	22.3	89.7	3800°
9	Theoretical Water Gas	50.0	.....	50.0	.....	.....	.....	.....	.....	.....	.52	2.39	325	298	.50	.50	1.89	2.39	20.9	90.3	3830°
10	Anthracite Producer Gas	24.0	7.5	16.5	50.2	0.6	1.2	.....	.....	.....	.85	1.05	134	124	.33	.19	1.36	1.69	19.5	65.6	3000°
11	Bituminous Producer Gas	27.0	4.5	14.0	50.9	0.6	3.0	.....	.....	.....	.86	1.24	150	140	.35	.19	1.49	1.84	19.0	69.2	3160°
12	Blast Furnace	27.5	10.0	3.0	58.0	1.0	0.5	.....	.....	.....	1.00	.78	102	100	.38	.04	1.21	1.59	23.9	61.0	2800°
13	Oil Gas Protero 1920	6.8	1.0	59.2	2.7	0.1	25.4	.....	3.8	1.0	.35	4.91	575	510	.47	1.21	3.91	4.38	10.7	84.2	3725°

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The proper drill size to obtain any required area can be found in the table below.

Drill Numbers—Diameters—Areas

Burner Spud Orifices			Burner Spud Orifices		
Drill No.	Diameter Inches	Area Sq. Ins.	Drill No.	Diameter Inches	Area Sq. Ins.
78	0.0160	.00020	25	0.1495	0.0176
75	0.0210	.00035	24	0.1520	0.0182
72	0.0250	.00049	23	0.1540	0.0186
70	0.0280	.00062	22	0.1570	0.0192
68	0.0310	.00077	21	0.1590	0.0199
66	0.0330	.00086	20	0.1610	0.0204
64	0.0360	.00102	19	0.1660	0.0217
62	0.0380	.00114	18	0.1695	0.0226
60	0.0400	.00126	17	0.1730	0.0235
58	0.0420	.00139	16	0.1770	0.0246
56	0.0465	.00170	15	0.1800	0.0255
54	0.0550	.00238	14	0.1820	0.0260
52	0.0635	.00317	13	0.1850	0.0269
50	0.0700	.00385	—	3/16	0.0276
49	0.0730	.00420	12	0.1890	0.0281
48	0.0760	.00454	11	0.1910	0.0287
47	0.0785	.00485	10	0.1935	0.0294
46	0.0810	.00516	9	0.1960	0.0302
45	0.0820	.00528	8	0.1990	0.0312
44	0.0860	.00581	7	0.2010	0.0317
43	0.0890	.00624	6	0.2040	0.0327
42	0.0935	.00690	5	0.2055	0.0332
41	0.0960	.00725	4	0.2090	0.0343
40	0.0980	.00755	3	.2310	0.0357
39	0.0995	.00780	—	7/32	0.0376
38	0.1015	.00810	2	.2210	0.0384
37	0.1040	0.00850	1	.2280	0.0408
36	0.1065	0.0089	—	15/64	0.0432
35	0.1100	0.0094	—	1/4	0.0491
34	0.1110	0.0097	—	17/64	0.0554
33	0.1130	0.0100	—	9/32	0.0621
32	0.1160	0.0106	—	19/64	0.0692
31	0.1200	0.0113	—	5/16	0.0767
—	1/8	0.0123	—	21/64	0.0846
30	0.1285	0.0130	—	11/32	0.0928
29	0.1360	0.0145	—	23/64	0.1015
28	0.1405	0.0155	—	3/8	0.1105
27	0.1440	0.0163	—	25/64	0.1198
26	0.1470	0.0170	—	13/32	0.1296

CHIMNEYS

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Heating and Ventilating Engineers

THE functions of a chimney are, generally speaking, twofold: (1) to produce the required draft, (2) to carry off the products of combustion and discharge them so as not to become a nuisance.

Where natural draft is employed the required draft is made up of: (*a*) that required to overcome the friction and to produce the velocity of the air at entrance to the furnace, (*b*) plus that necessary to force the air through the fuel bed (if any), (*c*) plus that necessary to produce the velocity and to overcome the friction of the products of combustion in their passage through the boiler, (*d*) plus that necessary to produce the velocity and to overcome the friction of the products of combustion in their passage through the breeching, from the boiler to the chimney, (*e*) plus that necessary to produce the velocity and to overcome the friction of the products of combustion in their passage through the chimney itself.

Where forced draft is employed factors (*a*) and (*b*), of the required draft, are usually taken care of by the forced draft apparatus, leaving the factors (*c*), (*d*) and (*e*) only, to be taken care of by the chimney.

Where induced draft is employed the entire draft required is generally taken care of by the induced draft apparatus.

In the case of either forced or induced draft any part of the required draft may be taken care of by the chimney and the remainder by the apparatus, but the exact conditions to be met in this respect should be known and the chimney should be proportioned accordingly.

This combination of natural and mechanical draft is frequently used, especially where loads are quite irregular, so that the plant may be run on natural draft during light loads and on mechanical draft during peak-loads, only. This combination also affords a factor of safety against breakdowns in the mechanical draft equipment, since at least a partial load may always be carried on natural draft.

Draft measurement is usually in inches of water by which is meant the static head of water (in inches) corresponding to the difference in pressure between any point in the boiler, breeching or chimney, at which the draft is being measured, and the pressure of the surrounding atmosphere. One inch of draft is equivalent to 5.2 pounds per square foot of pressure difference.

The theoretical draft of a chimney is the hypothetical draft that would be produced if the chimney were completely heated and filled with the normal gases of combustion, at the average temperature for which the chimney was designed, and then the flow of these gases was suddenly stopped. This theoretical draft can never be attained in practice, but it is the basis of all scientific chimney design.

Low-pressure heating plant chimneys of moderate capacities may be taken from the curves on page F26 with very satisfactory results.

According to their height, heating plant chimneys are divided into three classes, the erratic, uncertain and reliable. Chimneys less than 36 feet high are erratic in their action. The head produced by such a low height is so small that the least unfavorable conditions or interference practically puts the chimney out of commission.

At best the head produced by chimneys up to 64 feet in height is so small that the draft is frequently affected by surrounding conditions making the draft a doubtful one. Chimneys over 64 feet in height are not usually so affected, because as a rule the chimney is designed by an engineer and must be well built to sustain such a heavy load and the height is such as to produce considerable draft to offset unfavorable weather conditions, etc. Chimneys in this class produce about 0.00945 inches of theoretical draft per foot of height in zero weather with 600 degrees in the stack.

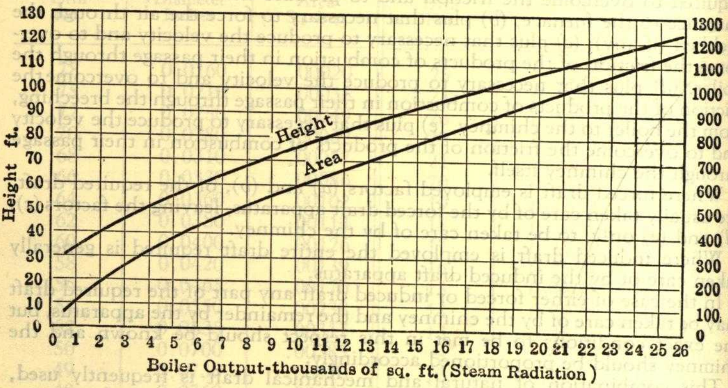


CHART FOR DETERMINING CHIMNEY SIZE

Note 1.—It is impossible to make a rule for chimney dimensions which would apply to all boilers but it will be found that in general all heating boilers when burning any coal except smallest sizes will deliver more than the output shown at the bottom of the above chart with the corresponding chimney dimensions, during the period when the boiler is likely to be in operation.

Note 2.—It is recommended that the manufacturer of the boiler be consulted in the case of exceptional boilers or where chimney dimensions are less than shown on chart for any given continuous output.

Note 3.—For battery installations the area of chimney is generally taken two-thirds to three-fourths the sum of the areas required for the same number of single boilers. The height is increased 5 to 15 feet above the single boiler chimney height in order to compensate for additional turns and damper leakage.

Note 4.—Chimneys for oil-fired boilers may usually be taken 75 per cent of height and area of chimney for same output with solid fuel except that in cases where the possible change to coal is contemplated the chimneys should be selected as for solid fuel.

Note 5.—For gas-fired boilers the chimney dimensions may be selected from the above chart, but do not have to supply draft to move the products of combustion through the boiler or to supply air to the boiler. They serve only to remove the products of combustion from the boiler room. The draft diverter supplied with all gas boilers effectively limits the draft at the boiler outlet and also prevents a reversal of direction of flow in the chimney from effecting boiler operation.

CONSTRUCTION OF CHIMNEYS

For general data on the construction of chimneys reference should be made to the Standard Ordinance for Chimney Construction of the National Board of Fire Underwriters. Briefly summarized these provisions are as follows for heating boilers and furnaces:

The construction, location, height and area of a chimney to which a heating boiler or warm-air furnace is connected affect the operation of the entire heating system. Most residence chimneys are built of brick and may be either lined or unlined, but in either case the *walls must be air-tight* and there should be *only one smoke opening* into the chimney. Clean-out, if provided, must be *absolutely air-tight* when closed.

The walls of brick chimneys shall be not less than 3¾ inches thick (width of a standard size brick) and shall be lined with fire-clay flue lining. Fire-clay flue linings shall be manufactured from suitable refractory clay, either natural or compounded, and shall be adapted to withstand high temperatures and the action of flue gases. They shall be of standard commercial thickness but not less than ¾-inch. All fire-clay flue linings shall meet the standard specification of the *Eastern Clay Products Association.* The flue sections shall be set in special mortar, and shall have the joints struck smooth on the inside. The masonry shall be built around each section of lining as it is placed, and all spaces between masonry and linings shall be completely filled with mortar. No broken flue lining shall be used. Flue linings shall start at least 4 inches below the bottom of smoke-pipe intakes of flues, and shall be continued the entire heights of the flues and project at least 4 inches above chimney top to allow for a 2-inch projection of lining. The wash or splay shall be formed of a rich cement mortar. To improve the draft the wash surface should be concave wherever practical.

Flue lining may be omitted in brick chimneys, provided the walls of the chimneys are not less than 8 inches thick, and that the inner course shall be a refractory clay brick. All brickwork shall be laid in spread mortar, with all joints push-filled. Exposed joints both inside and outside shall be struck smooth. No plaster lining shall be permitted.

Chimneys shall extend at least 3 feet above flat roofs and 2 feet above the ridges of peak roofs when such flat roofs or peaks are within 30 feet of the chimney. The chimney shall be high enough so that the wind from any direction shall not strike the top of the chimney from an angle above the horizontal. The chimney shall be properly capped with stone, terra cotta, concrete, cast iron, or other approved material; but no such cap or coping shall decrease the flue area.

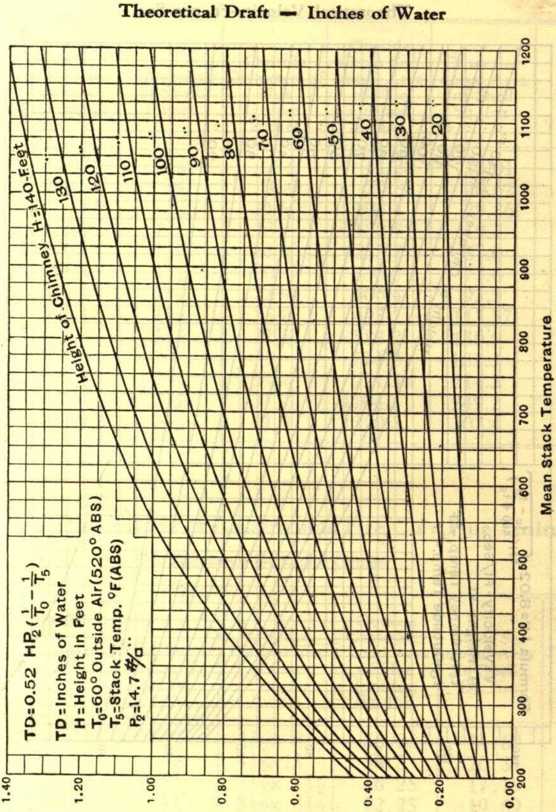
There shall be but one connection to the flue to which the boiler or furnace smoke-pipe is attached. The boiler or furnace smoke-pipe shall be thoroughly grouted into the chimney and shall not project beyond the inner surface of the flue lining.

The size or area of flue lining or of brick flue for warm-air furnaces depends on height of chimney and capacity of heating system. For chimneys not less than 35 feet in height above grate line, the net internal dimensions of lining should be at least 7 x 11½ inches for a total leader pipe area up to 790 square inches. Above 790 and up to 1000 square inches of leader pipe area the lining should be at least 11¼ x 11¼ inches inside. In case of brick flues not less than 35 feet in height with no linings, the internal dimensions should be at least 8 x 12 inches up to 790 square inches of leader area, and at least 12 x 12 inches for leader capacities up to 1000 square inches. Chimneys under 35 feet in height are unsatisfactory in operation and hence should be avoided.

SMOKE TEST

The chimney flue shall be subjected to a smoke test by the mason contractor in the presence of the architect or his representative, after the mortar has thoroughly hardened, and must be *smoke tight.*

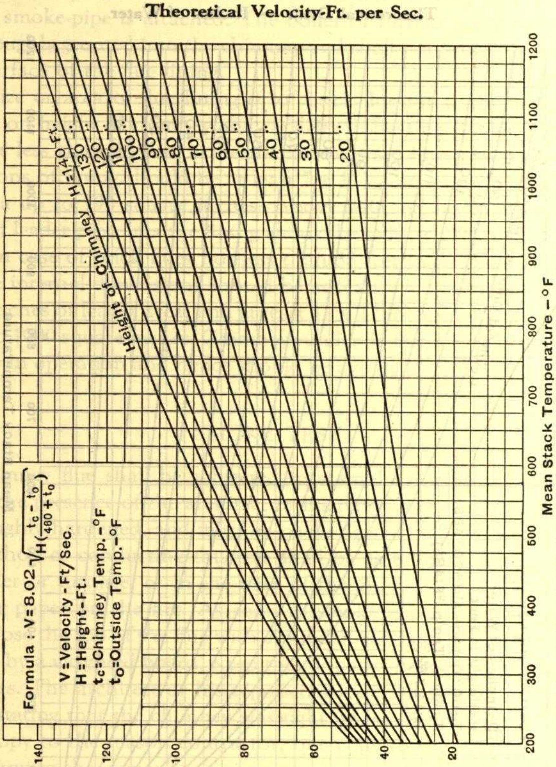
The method of conducting this test shall be as follows: With a good fire in the boiler or furnace, or in the base of the chimney, put about a square yard of tar paper on the fire. As soon as smoke appears at the top of the chimney close the top of the flue with a piece of old carpet or wet newspapers held down by a weighted board. Keep the tar paper burning in the firepot for five minutes. The architect or his representative shall sign an acceptance in triplicate, stating that the chimney was tight under the above test, and shall give one copy to the mason contractor, one copy to the heating contractor and one copy to the owner.



THEORETICAL DRAFT AT VARIOUS HEIGHTS AND TEMPERATURES

From this chart the theoretical draft in inches of water can be obtained when the mean stack temperatures and height of chimney are known.

For Example: Mean stack temperature 600 degrees Fahrenheit, chimney height 100 feet. The intersection of the vertical line showing 600 degrees Fahrenheit mean stack temperature with curve showing chimney height 100 feet gives the theoretical draft of .75 inch of water which is read on left hand side of chart. The theoretical draft is always greater than that actually found in practice, the difference being due to the pressure necessary to force the gases through the stack against their own inertia and the friction against the side of the chimney.



THEORETICAL VELOCITIES AT VARIOUS HEIGHTS AND TEMPERATURES

From this chart the theoretical velocity in feet per second of gases in chimney for various heights and temperatures can be obtained.

Example: Given the mean stack temperature of 600 degrees Fahrenheit, and stack height 100 feet. The intersection of the vertical line showing 600 degrees Fahrenheit mean stack temperature with curve showing chimney height 100 feet, gives the theoretical velocity of approximately 82 feet per second, which is read on left hand side of chart.

In practice the theoretical velocity is never obtained due to friction and other causes. The actual velocity will vary from 25 to 50 per cent of the theoretical depending on size of chimney and nature of interior surface.

Standard Dimensions of Round Fire Clay Flue Linings

Inside Diameter of Flue Linings, Inches	Inside Cross Sectional Area of Flue Linings, Sq. Ins.	Thickness of Shell, Inches	Outside Diameter of Flue Linings, Inches	Outside Cross Sectional Area of Flue Linings, Sq. Ins.	Cross Sectional Area of Shell, Sq. Ins.	Length, Feet
6	28.27	5/8	7¼	41.28	13.01	2
8	50.26	¾	9½	70.88	20.62	2
10	78.54	7/8	11¾	108.4	29.86	2
12	113.0	1	13	132.7	19.7	2
15	176.7	1⅛	17¼	233.7	57.0	2
18	254.4	1¼	20½	330.0	75.6	2
20	314.1	1⅜	22¾	406.4	92.3	2
22	380.13	1⅝	25⅛	495.7	115.57	2
24	452.3	1⅝	27¼	583.2	130.9	2
27	572.5	2	31	754.8	182.3	2½
30	706.8	2⅛	34¼	921.3	214.5	2½
33	855.3	2¼	37½	1104.5	249.2	2½
36	1017.9	2½	41.0	1320.3	302.4	2½

Standard Dimensions of Rectangular Fire Clay Flue Linings

No Allowance for Radial Corners

Inside Dimensions of Flue Linings, Inches	Inside Cross Sectional Area of Flue Linings, Sq. Ins.	Thickness of Shell, Inches	Outside Dimensions of Flue Linings, Inches	Outside Cross Sectional Area of Flue Linings, Sq. Ins.	Cross Sectional Area of Shell, Sq. Ins.	Length, Feet
3¼x 7¼	23.56	⅝	4½x 8½	38.25	14.69	2
3¼x11¾	38.19	⅝	4½x13	58.5	20.31	2
6¼x 6¼	39.06	⅝	7½x 7½	56.25	17.19	2
7¼x 7¼	52.56	⅝	8½x 8½	72.25	19.69	2
7 x11½	80.5	¾	8½x13	110.5	30.0	2
6¾x16¼	109.69	⅞	8½x18	153.0	43.31	2
11¼x11¼	126.56	⅞	13 x13	169.0	42.44	2
11¼x16¼	182.84	⅞	13 x18	234.0	51.16	2
15¾x15¾	248.06	1⅛	18 x18	324.0	75.94	2
17¼x17¼	297.56	1⅜	20 x20	400.0	102.44	2
17 x21	357.0	1½	20 x24	480.0	123.0	2
21 x21	441.0	1½	24 x24	576.0	135.0	2

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BOILERS

Blowing Off Steam Boilers

After a steam boiler has been in operation for a time, grease, oil and other foreign matter will have accumulated in it and may lead to an improper generation of steam. Quite frequently, under such conditions, water is thrown into the steam mains and causes pounding. A practical method of determining when the water in a boiler is free from disturbing impurities, is to drain a sample from the gage cock into a vessel and boil it over a gas plate or other hot fire. At the same time boil an equal quantity of boiler feed water. If a marked difference in the liberation of steam from the surface is observed, the boiler should be cleaned. Another indication of dirty boiler water would be the discharge of water and steam from a boiler under pressure (2 to 5 pounds), through the safety valve when its lifting lever is raised.

To obtain the most satisfactory results a CLEAN BOILER is ABSOLUTELY NECESSARY. The method of cleaning boilers, given below, has been used successfully. Connect a pipe with a gate valve to the blow-off opening or to the safety valve tapping and run it to the nearest drain. If safety valve tapping is used, insert a close nipple and tee. Replace safety valve in top of tee and use side opening for blow-off line. Close all radiator valves and boiler return valve. With the water in the boiler at the level of the blow-off opening, or if safety valve tapping is used, at the top of gauge glass and the valve in the blow-off line closed, build a brisk coal fire to create a pressure of from 5 to 10 pounds. Open valve in blow-off line and close it when pressure has dropped to zero to permit pressure to build up. Carefully supply fresh water to the boiler to maintain the proper level and continue to repeat the above process for 2 to 4 hours. Close the water feed valve and drain boiler until the water level is at top of gauge glass, then draw fire quickly and with at least 10 pounds pressure drain boiler through bottom blow-off. Refill boiler with water to proper level before firing. At times one blowing off will not give the desired results, so that this process must be continued until the boiler is thoroughly cleansed. There are on the market a number of boiler cleaning compounds, which if used will aid in obstinate cases where abnormal quantities of grease and dirt are encountered. Sal-soda or lye are often used with good results.

On new installations it is good practice, wherever possible, to allow the condensation from the system to drain to the sewer, during the first week of operation, thereby preventing the passage of grease and dirt to the boiler. During this time the feed water valve should be cracked sufficiently to maintain the proper water level in the boiler. The duration of this procedure will be dependent upon the nature of the feed water as it would be objectionable to permit the formation of scale on the heating surfaces.

Boiler Troubles*

A complaint regarding boiler operation will generally be found to be one of the following:

1. The boiler fails to deliver enough heat. The cause of this condition may be: (a) poor draft, (b) poor fuel, (c) inferior attention or firing, (d) boiler too small, (e) improper piping, (f) improper arrangement of sections, (g) heating surfaces may be covered with soot and (h) insufficient radiation installed.

2. The water line is unsteady. The cause of this condition may be: (a) grease and dirt in boiler, (b) water column connected to a very active section and therefore may not be showing actual water level in boiler, (c) boiler operating at excessive output.

3. Water disappears from gage glass. This may be caused by: (a) priming due to grease and dirt in boiler, (b) too great pressure difference between supply and return piping causing water to back into return, (c) valve closed in return line, (d) connection of bottom of water column into a very active section or thin waterway, (e) improper connection between boiler in battery permitting boiler with excess pressure to push water into boiler with lower pressure.

4. Boiler causes water to be carried into steam main. This may be caused by: (a) grease and dirt in boiler, (b) insufficient steam dome or too small steam liberating area, (c) outlet connections of too small area, (d) excessive rate of output, (e) water level carried higher than specified.

5. Boiler is slow in response to operation of dampers. This may be due to: (a) poor draft due to air leaks into chimney or breeching, (b) inferior fuel, (c) inferior attention, (d) accumulation of clinker on grate, (e) boiler too small for the load.

6. Boiler requires too frequent cleaning of flues. This may be due to: (a) poor draft, (b) smoky combustion, (c) too low rate of combustion, (d) too much excess air in firebox causing chilling of gases.

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7. Boiler smokes through fire door. This may be due to: (a) defective draft in chimney or incorrect setting of dampers, (b) air leaks into boiler or breeching, (c) gas outlet from firebox plugged with fuel, (d) dirty or clogged flues.

How to Clean Water Gage Glass on Steam Boiler Without Removing It

1. Pour at least a tablespoon of raw muriatic or other acid into a cupful of hot water drawn from the boiler.

2. Close both water-gage valves.

3. Open top water-gage valve and also pet cock at bottom, and blow water out of glass. Then immediately close the top valve and submerge end of pet cock in cup of hot-water solution. A vacuum is at once created in gage glass which causes solution in the cup to rush in.

4. Keep the pet cock immersed and operate the top valve, slightly opening and closing, alternately expelling and drawing in the solution until all grease, oil, or other matter adhering to the inside of the glass is cut out. Then close pet cock and open both water-gage valves.

It is necessary to have 1 pound pressure of steam or more on the boiler before commencing this operation, which need not occupy more than 10 minutes. The result is a clean glass without the risk of breakage and probable renewal of gaskets which is frequently the case when removing the glass for cleaning.

MEASURING BOILER DEMANDS

The total estimated load (before selecting the size of boiler for any heating job) should include (a) ALL radiators, (b) ALL piping, (c) ALL attachments for heating water for domestic use and (d) any and all other heat consuming apparatus contemplated for use on the job.

ALL of the ACTUAL heat transmitted by ALL of the just-enumerated apparatus a, b, c, d should then be converted to the terms used by makers of heating apparatus and by heating contractors—namely, Equivalent Direct Radiation having a heat emission of 240 B.t.u. per square foot of heating surface per hour for a steam job and 150 B.t.u. per square foot of heating surface per hour for a water job.

For types of special radiators such as the following, add to the actual (240 B.t.u. steam or 150 B.t.u. water) heating surface the following percentages to obtain the equivalent direct radiator load:

Wall radiators on inside walls	25%
Direct-indirect radiators	25%
Indirect radiators	50%

For blast heaters or forced air unit heaters the actual equivalent direct radiator load should be computed for the prevailing conditions under which the heaters are to be operated, or taken from listings furnished by the heater manufacturer and included with the other heating factors to determine the total net equivalent boiler capacity.

For cases where direct column radiators are installed for heating at lower than normal air temperature (70 degrees Fahrenheit) the ACTUAL installed AMOUNT of direct column radiation should be increased by the following percentages—to determine the equivalent direct column radiator load imposed upon the boiler:

Air Temperature Surrounding Radiator	Steam or Water
70 degrees Fahrenheit	....
65 degrees Fahrenheit	5 per cent
60 degrees Fahrenheit	9 per cent
55 degrees Fahrenheit	14 per cent
50 degrees Fahrenheit	18 per cent
45 degrees Fahrenheit	23 per cent
40 degrees Fahrenheit	28 per cent

When domestic hot water is heated by a coil in the firebox or a steam coil in storage tank, the boiler load should be increased by an amount equal to 1½ square feet of equivalent (240 B.t.u.) direct radiation for each gallon of tank capacity.

For water boilers with coil in firebox an allowance of 2½ square feet of equivalent (150 B.t.u.) direct water radiation should be made for each gallon tank capacity.

For externally attached water heaters below water line of steam boilers an allowance of 1½ square feet equivalent (240 B.t.u.) direct steam radiation should be made for each gallon of hot water storage tank capacity.

For externally attached water heaters below the water line of steam boilers without hot water storage tank, the size of boiler should be increased to an extent equal to 4 square feet equivalent (240 B.t.u.) direct steam radiation for EACH gallon of water heated per hour.

The additional load imposed upon a boiler due to piping heat loss varies with the nature of the covering and the size of the installation. For the usual installation with average covering an additional allowance of 25 per cent of the actual direct radiator load is found ample. For installations with uncovered piping or where portions of the piping are used for heating, its equivalent direct radiator load should be determined and added.

EXAMPLE:

Estimate the total equivalent direct radiator load for a steam system requiring:

300 square feet direct column radiation in air of 70 degrees Fahrenheit
100 square feet direct column radiation in air of 60 degrees Fahrenheit
100 square feet wall radiation in air of 50 degrees Fahrenheit
100 square feet indirect radiation
80 gallon domestic hot water tank to be heated by means of an externally attached water heater
1 Unit Heater—fan type, delivering an equivalent output of 200 square feet equivalent direct radiation

All piping to be covered with Air-cell insulation 1 inch thick.

COMPUTATION:

300 sq. ft. direct column radiation in air of 70 deg. Fahr.	=300 E.D.R.*
100 sq. ft. direct column radiation in air of 60 deg. Fahr.	=109 E.D.R.
100 sq. ft. wall radiation in air of 50 deg. Fahr. = 100 x 1.25 x 1.18	=148 E.D.R.
100 sq. ft. indirect radiation—100 x 1.5	=150 E.D.R.
100 sq. ft. direct-indirect radiation = 100 x 1.25	=125 E.D.R.
80 gallon storage tank = 80 x 1.5	=120 E.D.R.
1 Unit Heater	=200 E.D.R.
Because of the many types of radiators used on this job it would be necessary to compute the exact amount of piping which in this example is assumed to be equivalent to 150 square feet	=150 E.D.R.
Total Equivalent Direct Radiation Load (240 B.t.u. per square foot)	1302 Sq. Ft.

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* E.D.R. = Equivalent Direct Radiation.

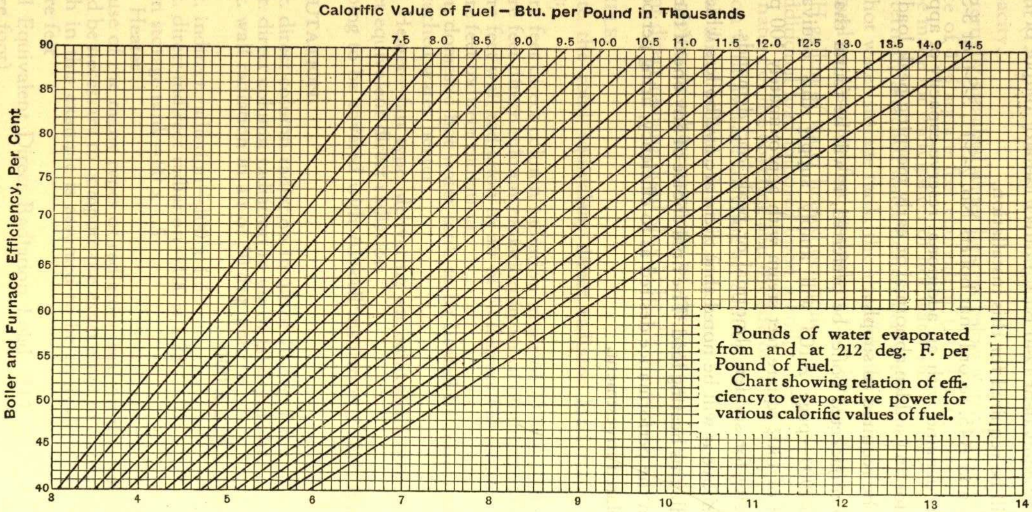
From the foregoing it will be noted that a boiler capable of delivering an average hourly equivalent (240 B.t.u.) direct radiator output of 1302 square feet steam will be required for this installation.

Pages A44 and A45, record that boilers No. 2-S-11, 3-S-6 or 3-S-7 are adequate for this demand with an additional reserve capacity of approximately 100 per cent for any sudden abnormal or early morning peak load which the boiler might be required to supply.

Should an unjacketed boiler be preferred, it will be found that either an S-2908 or S-2909—page A103 will amply supply this equivalent direct radiator load of 1302 square feet steam with approximately 100 per cent for reserve capacity for sudden abnormal or peak load demands.

From the above it will be noted that there are five boilers which will adequately handle this heating load. The final choice of any one of them depends entirely upon the performance desired as to efficiency, firing period, etc., and the contemplated investment.

EFFICIENCY—EVAPORATIVE POWER



From above chart the equivalent Evaporative Power of a boiler can be determined when the boiler efficiency and heat value of the coal are known.

For example: A boiler having an efficiency of 60% and burning 13,000 B.t.u. coal, has an equivalent evaporative power of 8.

COAL AND COMBUSTION RATES

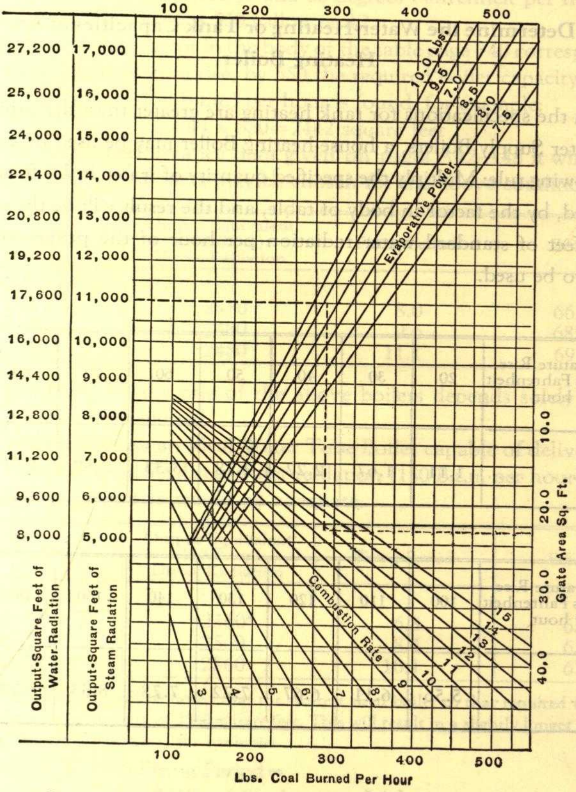


Chart for Determining Coal Burned per Hour and Combustion Rate

From this chart the combustion rate of a given boiler can be determined when the evaporative power and output are known.

For example: To determine combustion rate of a boiler of 11,000 square feet steam output-evaporative power 9.5 pounds, and grate area 23 square feet, proceed as follows. Follow horizontally on the line of 11,000 square feet output shown on left hand side of page to intersection with evaporative power line 9.5 then downward to intersection of horizontal line showing 23 square feet grate area, at the intersection of these two lines read combustion rate, which is approximately 13 pounds per square foot of grate.

WATER HEATING

How to Determine the Water-Heating or Tank Capacities of Any IDEAL Heating Boiler

When the specifications for tank heating are greater than the capacities of Hot Water Supply Boilers, a house-heating Boiler may be used by employing the following rule: Multiply the specified quantity of water in U. S. gallons to be heated, by the factor in body of table, and the result will be the output in square feet of standard water radiation per hour of the proper size IDEAL BOILER to be used.

Temperature Rise in degrees Fahrenheit per hour	20	30	40	50	60	70	80	90
Factor..........	1.11	1.67	2.22	2.78	3.33	3.89	4.44	5.00

Temperature Rise in degrees Fahrenheit per hour	100	110	120	130	140	150	160	170
Factor..........	5.56	6.11	6.67	7.22	7.78	8.33	8.89	9.44

Example:

What size boiler is required to add 80 degrees Fahrenheit per hour to 550 gallons of water stored in a 550 gallon tank?

By multiplying the factor in the body of the table page F40 corresponding to an 80 degrees temperature rise, by 550 the required boiler capacity in square feet water radiation (150 B.t.u.) per hour is found, for example:

4.44 x 550 = 2442 square feet

From the boiler performance data given on pages A42-A43 it will be noted any of the following boilers may be chosen for the above conditions.

Boiler No.	Output Equivalent (150 B.t.u.) Direct Radiation	Firing Period	Efficiency
Pages A42-A43			
2-W-7	2480	8.0	66.5%
2-W-8	2480	9.6	68%
2-W-9	2480	11.1	69%

The final choice of any one of the above boilers depends solely upon the boiler performance required.

If it is desired to use an Ideal Water Tube Boiler capable of delivering 2442 square feet of equivalent direct water radiation (150 B.t.u. per hour), any one of the following boilers would be adequate:

Boiler No.	Output Equivalent (150 B.t.u.) Direct Radiation	Firing Period	Efficiency
Pages A67-A68			
W-2906	2560*	6.8	63.5
W-2907	2560	8.4	65.5
W-2908	2560	10.1	67.5

* From the above it will be noted that the nearest sized boiler to that required (2442 square feet) has an output capacity of 2560 square feet. This will result in a slightly longer firing period assuming the same efficiency, for example:

For Boiler W-2906 Firing Period =

$$\frac{2560 \times 6.8}{2442} = \text{Approx. } 7.1 \text{ hours}$$

Heating Power of Brass and Iron Pipe Lying Horizontally in Water Storage Tanks

For pipe-coils used in the firepot of steam or water boilers or hot air furnaces in heating water for domestic purposes, etc., there is little difference in the total heat transmitted from the small amount of pipe used—whether iron or brass. But for large water storage tanks where quite a little piping is necessary to heat the water, the results in the use of pipes of these two metals vary somewhat. To bring out reliable working information our Institute of Thermal Research has prepared a comparative chart which is reproduced on page F43. It is plotted from numerous tests made with brass and iron pipings, lying in horizontal position in a tank of water. To allow for bad water and the consequent fouling and pitting of pipes, only half of the actual condensing power is shown on the chart.

Example 1. It is required to condense 500 pounds of steam per hour in a pipe-coil immersed in the water of a storage tank. How many square feet of pipe should the coil contain?

Temperature of steam in pipe	220 degrees
Initial temperature of water	40 degrees
Terminal temperature of water	160 degrees
Mean temperature of water	100 degrees
Temperature difference steam and water	120 degrees

Observe that the line for IRON pipe intersects the vertical line of 120 degrees temperature difference at the horizontal line representing 22.4 pounds. The intersection of the line for BRASS pipe shows 34.5 pounds.

The quantity of pipe required in square feet is determined by dividing the 500 pounds of steam which must be condensed per hour by the quantity of steam one square foot of pipe will condense. Thus:

For IRON pipe.......... $500 \div 22.4 = 22.2$ square feet would be required.

For BRASS pipe.......... $500 \div 34.5 = 14.5$ square feet would be required.

Example 2. Suppose a tank containing 300 U. S. gallons of cold water at 60 degrees Fahrenheit is to be heated by low pressure steam (at 5 pounds pressure) to a temperature of 140 degrees, in 2 hours; how many square feet of BRASS pipe will be required, and how much steam will be condensed per hour?

300 U. S. gallons weight 300×8.33	2500 pounds
Total temperature rise desired	80 degrees
Temperature rise per hour	40 degrees
Heat required per hour $= 2500 \times 40$	100,000 B.t.u.
Temperature of steam at 5 pounds' pressure (approximately)	227 degrees
Mean temperature of water	100 degrees
Mean temperature difference between steam and water	127 degrees

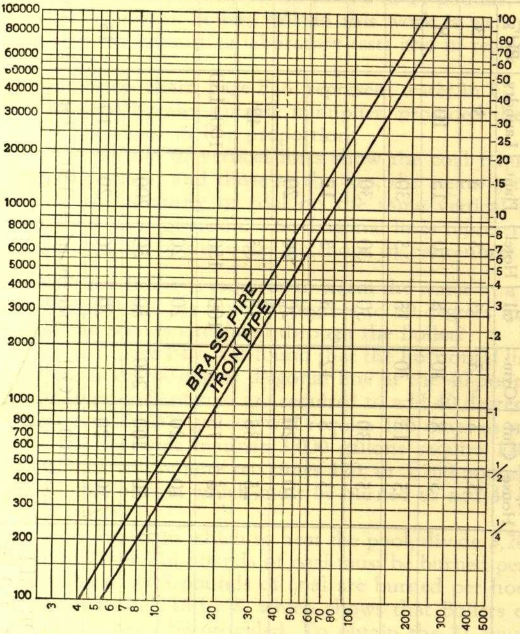
Where the line for BRASS pipe intersects the vertical for 127 degrees, read the transmission per square foot, 36,500 B.t.u., and the condensing power, 38 pounds of steam per square foot per hour. The total square feet of BRASS pipe required will then be $100{,}000 \div 36{,}500 = 2.74$ square feet. The condensation per hour would be $2.74 \times 38 = 104.1$ pounds.

Heating Power of Brass and Iron Pipe

For Water Storage Tanks

For use with Low Pressure Steam, up to 10 pounds by gauge

A "factor of safety" of 50% is included, to allow fouling of pipe



Temperature difference in degrees Fahrenheit between steam in coil and mean or average temperature of water in tank. See page F42 for examples.

WATER HEATING DATA

Hot Water Consumption for Various Types of Buildings

Figured at a final temperature of 150° Fahr. *Gallons of Water per Hour per Fixture*

	Apt. House	Club	Gym.	Hospital	Hotel	Indus-Plant	Laundry	Office Bld'g.	Public Bath	Private Res.	School	Y. M. C. A.
Private Lavatory	3	3	3	3	3	3	3	3	3	3	3	3
Public Lavatory	5	8	10	8	10	15	10	8	15	3	18	10
Bath Tubs	15	15	30	15	15	30			45	15		30
Dish Washers	15	30		30	30	30				15	15	30
Foot Basins	3	3	12	3	3	12				3	3	12
Kitchen Sink	10	20		20	20	20				10	10	20
Laundry Stat. Tubs	25	35		35	35		42			25		35
Laundry Rev. Tubs	75	75		100	150		100–150		100	75		100
Pantry Sinks	10	20		20	20					10	20	20
Showers	50	200	200	50	50	200			200	50	200	200
Slop Sinks	20	20		20	30	20	10	15	15	15	20	20
Dish Washers		300 Gal. per hour at 180° for serving capacity of 500 people.										
TOTAL WATER FOR ALL FIXTURES LIKELY TO BE DRAWN AT ONE TIME—%	20	50	80	60	50	90	100	15	100	50	25	75
STORAGE CAPACITY IN % OF MAXIMUM HEATING CAPACITY	100	75	50	50	25	50	25	100	50	100	50	50

SWIMMING POOL DATA

Boiler Power to Heat Swimming Pool

In heating large bodies of water, large boilers are employed, and when anthracite coal is burned in Ideal Boilers there will be available, from each pound of coal burned, an average of 8,333 British thermal units, or 8.6 pounds water will be evaporated, and on this basis the chart on page F46 is plotted. The basis for finding the size Ideal Boiler required for a given quantity of work is the number of pounds of hard coal burned per square foot of grate per hour. This quantity varies from 8 to 11 pounds, depending on type of boiler. That Ideal Boilers will do this work is well proven by actual demonstration, in exhaustive laboratory tests and in regular installations.

The horizontal lines on chart, page F46, represent water in U. S. gallons, which may be increased by any suitable multiplier, provided the coal and steam required are increased in like proportion.

The figures at the bottom of vertical lines show the coal required, each line representing 10 pounds, and those at the top, the steam generated by the combustion of the quantity of coal on the same vertical line—each line representing 86 pounds of steam. The diagonal lines represent the rise, or increase, in temperature of the water per hour in Fahrenheit degrees.

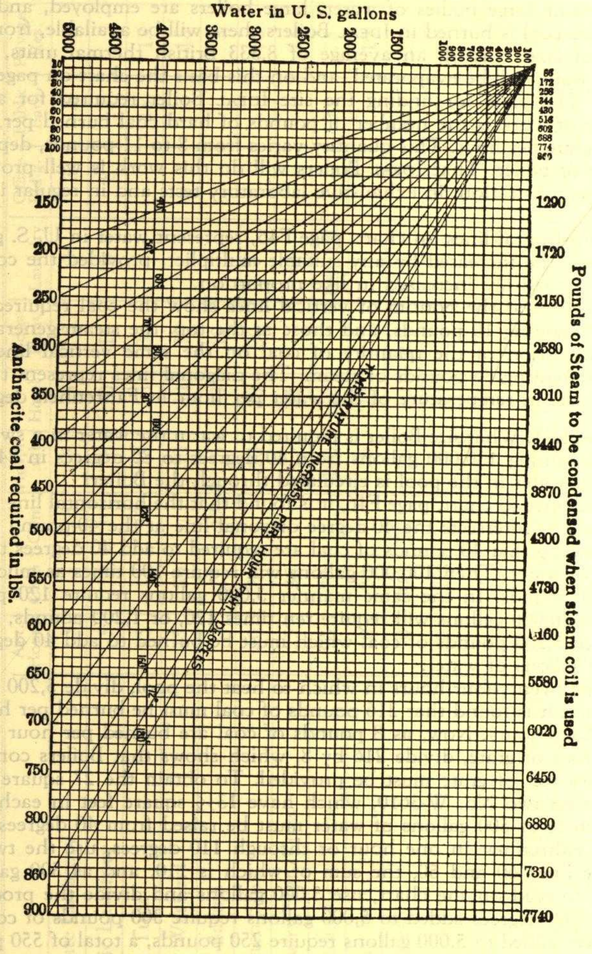
Example 1. What size Boiler is required to warm the water in a swimming pool containing 130,000 gallons from 40 degrees to 80 degrees in 24 hours, when the water in the pool is circulated through the Boiler?

By reference to chart, page F46, it is found that the horizontal line marked 1,000 gallons intersects the 40-degree diagonal line at the 40-pound vertical line, showing that 40 pounds of coal are required to add 40 degrees to 1,000 gallons of water. Then 100,000 gallons will require 100 times as much coal, or 4,000 pounds. In the same manner 3,000 gallons require 120 pounds, and that 30,000 gallons will require ten times 120, or 1,200 pounds, making a total of 5,200 pounds of coal which must be burned to add 40 degrees to 130,000 gallons of water.

Having twenty-four hours in which to heat the pool, divide 5,200 pounds by 24, and it is found that 216 pounds of coal must be burned per hour for twenty-four hours. Now, as 8 pounds of coal are burned per hour on one square foot of grate, divide 216 by 8, which shows that Boilers containing 27 square feet of grate must be provided. To obtain the 27 square feet of grate, select two No. W-3610, which have 13½ square feet in each. If the temperature of 500 gallons of water must be raised from 40 degrees to 150 degrees Fahrenheit in one hour or through 110 degrees, use the two temperature lines 60 and 50, the sum of which is 110, and as 500 gallons is difficult to read on the chart, use 5,000 gallons and divide the product by 10, thus: 60 degrees added to 5,000 gallons require 300 pounds of coal, and 50 degrees added to 5,000 gallons require 250 pounds, a total of 550 pounds; one-tenth of which is 55 pounds, requiring a Boiler with a grate area of 7 square feet.

How to Find Boiler Power Required to Heat Swimming Pools

(See explanation on pages F45 and F47)



Boiler Power Required to Heat

Heating Pools by Steam Coils

Example 2. If the same pool under like conditions is to be heated by steam through pipe coils and the temperature of the steam is 220 degrees, the mean temperature of the water is 40 plus 80 divided by 2 equals 60 degrees and 220 minus 60 equals 160 degrees temperature difference between steam and water.

Turn to chart, page F43, and note that with this temperature difference 1 square foot of iron pipe will condense about 36 pounds of steam per hour, and as 216 pounds of coal must be burned per hour, find by interpolation in chart, page F46, that 216 pounds of coal will evaporate 1,857 pounds steam, which divided by 36 will give in round figures 52 square feet, the amount of condensing pipe required. The grate surface of Boilers will be the same as in Example 1.

Fifty-two square feet is equal to 120 lineal feet of 1¼-inch pipe, 104 feet 1½-inch, or 83 feet 2-inch. If but twelve hours can be allowed to do the work, double the hourly consumption of coal and steam and furnish Boilers of double the capacity required for twenty-four hours' time.

For the twelve-hour period there will be just double the quantity of steam to condense per hour, requiring 104 square feet of condensing coil.

There is, however, another factor which must not be overlooked. In large bodies of water warmed in the manner just described, there will be a zone, of which the condensing pipe is the center, where the mean temperature of the water will be much higher than figured in the foregoing, unless artificial means are employed to agitate the water and keep it all at an even temperature. It will, therefore, be good practice to add at least 50 per cent to the condensing coil when used in large bodies of still water.

Hard Coal versus Soft Coal

All computations in these charts are made on the basis of Anthracite coal. Where it is desired to use fuel other than Anthracite coal proper allowance should be made. Some Bituminous coals and a few grades of Eastern Bituminous yield practically the same quantities of available heat per pound as do Anthracite fuels. Middle West Bituminous, and the lower grades of soft coal, such as Sub-Bituminous and Lignites found in the far West which are very high in volatile and moisture content, vary in their heat value to such an extent as to make it necessary to consider each individual case by itself.

COEFFICIENTS OF HEAT TRANSMISSION

The following list shows the coefficients of heat transmission (B.t.u. per square foot per hour per degree Fahrenheit difference in temperature) for various building structures.

Walls

(a) Masonry

Thickness in Inches	TYPE OF WALL A	B	C	D	E	F	G	H
4	0.60	0.49	0.33	0.30	0.90	....	0.57	....
8	0.42	0.38	0.27	0.26	0.60	0.50	0.42	0.28
12	0.32	0.29	0.23	0.22	0.45	0.40	0.38	0.25
16	0.26	0.25	0.21	0.20	0.40	0.34	0.30	0.22

A: Plain Brick.
B: Brick—Plaster One Side.
C: Brick, Furring, Lath and Plaster.
D: Brick, Hollow Tile and Plaster One Side.
E: Concrete.
F: Concrete, Fur, Lath and Plaster.
G: Terra Cotta or Hollow Tile Stucco.
H: Terra Cotta or Hollow Tile Furred and Plastered.

(b) Frame

Clapboards on Studding	0.70
Clapboards and Paper on Studding	0.48
Clapboards, Paper, Sheathing, Studding, Lath and Plaster	0.24
Clapboards, Sheathing, Studding, Lath and Plaster	0.29

Doors

Single Door	1.1
Double Door	0.6

Windows

Single Windows	1.1
Single Window with Double Glass	0.6
Double Window	0.6
Skylight	1.3
Single Monitor	1.3

Floors

(a) Earth Below

Dirt as Flooring	0.20
Cement or Tile on Dirt	0.31
Wooden Beams Planked on Dirt	0.13

(b Floors Exposed to Air Below

¾″ Wood Flooring on Joists	0.29
¾″ Wood Flooring on Joists, Lath and Plaster Beneath	0.19
Double Wood Flooring on Joists	0.20
Double Wood Flooring on Joists, Lath and Plaster Beneath	0.13

Ceilings

Lath and Plaster—No Flooring Above	0.50
Lath and Plaster—Single Floor Above	0.28
Steel Ceiling with Floor Above	0.35

Roof

2″ Concrete Cinder Fill Tar and Gravel	0.80
4″ Concrete Cinder Fill Tar and Gravel	0.60
6″ Concrete Cinder Fill Tar and Gravel	0.53
Metal on Wood Frame	1.30
Slate or Tile with Paper on Wood Sheathing	0.38
Slate or Tile on Wood Sheathing	0.80
Shingles, Sheathing and Studding	0.40
Shingles, Sheathing, Studding, Lath and Plaster	0.30
Composition Roof Paper on 1″ Boards	0.44
Composition Roof Paper on 1½″ Boards	0.32
Composition Roof Paper on 2″ Boards	0.27

Add to Radiation for Intermittent Heating

Ten per cent if heated day time only, and the location of the building is not exposed.

Twenty per cent when the building is heated day time only, and the location of the building is exposed.

Thirty per cent when the building is heated intermittently with long intervals of non-heating.

NOTE.—The above factors are compiled from well-known authorities but are not guaranteed.

INSIDE TEMPERATURES USUALLY SPECIFIED

Reprinted by courtesy of the American Society of Heating and Ventilating Engineers.

Type of Building	Deg. Fahr.
SCHOOLS—	
Class Rooms	68
Assembly Rooms	66–68
Gymnasium	55–65
Toilets and Baths	70
Wardrobe and Locker Rooms	65–68
Kitchens	66
Dining and Lunch Rooms	65–68
Playrooms	60–65
Natatoriums	75
THEATRES—	
Seating Space	68–72
Lounge Rooms	68
Toilets	68
HOSPITALS—	
Private Rooms	70
Private Rooms (surgical)	70–80
Operating Rooms	70–95
Wards	68
Kitchens and Laundries	66
Toilets	68
Bathrooms	70–80
HOTELS	
Bedrooms and Baths	70
Dining Rooms	70
Kitchens and Laundries	66
Ball Rooms	65–68
Toilets and Service Rooms	68
HOMES	
Where 68 degrees is generally the desirable standard of temperature a guarantee of 70 degrees is customarily exacted.	
STORES	65–68
PUBLIC BUILDINGS	68–70
WARM AIR BATHS	120
STEAM BATHS	110
FACTORIES AND MACHINE SHOPS	60–65
FOUNDRIES AND BOILER SHOPS	50–60
PAINT SHOPS	80

Air Changes Taking Place under Average Conditions Exclusive of Air Provided for Ventilation

Kind of Room or Building	Number of Air Changes Taking Place per Hour
Rooms, 1 side exposed	1
Rooms, 2 sides exposed	1½
Rooms, 3 sides exposed	2
Rooms, 4 sides exposed	2
Rooms with no windows or outside doors	½ to ¾
Entrance Halls	2 to 3
Reception Halls	2
Living Rooms	1 to 2
Dining Rooms	1 to 2
Bath Rooms	2
Drug Stores	2 to 3
Clothing Stores	1
Churches, Factories, Lofts, etc.	½ to 3

*Outside Temperatures and Wind Velocities Compiled from U. S. Weather Bureau Records

Col. A	Col. B	Col. C	Col. D	Col. E	Col. F
State	City	Average Temp., Oct. 1st–May 1st	Lowest Temperature	Average Wind Velocity Dec., Jan., Feb., M. per Hr.	Direction of Prevailing Wind, Dec., Jan., Feb.
Ala.	Mobile	57.7	−1	8.3	N
	Birmingham	53.9	−10	8.6	N
Ariz.	Phoenix	59.5	16	3.9	E
	Flagstaff	34.9	−25	6.7	SW
Ark.	Fort Smith	49.5	−15	8.0	E
	Little Rock	51.6	−12	9.9	NW
Cal.	San Francisco	54.3	29	....	N
	Los Angeles	58.6	28	....	NE
Colo.	Denver	39.3	−29	7.4	S
	Grand Junction	39.2	−16	5.6	SE
Conn.	New Haven	38.0	−14	9.3	N
D. C.	Washington	43.2	−15	7.3	NW
Fla.	Jacksonville	61.9	10	8.2	NE
Ga.	Atlanta	51.4	−8	11.8	NW
	Savannah	58.4	8	8.3	NW
Idaho	Lewiston	42.5	−13	4.7	E
	Pocatello	36.4	−20	9.3	SE
Ill.	Chicago	36.4	−23	17.0	SW
	Springfield	39.9	−24	10.2	NW
Ind.	Indianapolis	40.2	−25	11.8	S
	Evansville	44.1	−15	8.4	S
Iowa	Dubuque	33.9	−32	6.1	NW
	Sioux City	32.1	−35	12.2	NW
Kans.	Concordia	38.9	−25	7.3	N
	Dodge City	40.2	−26	10.4	NW
Ky.	Louisville	45.2	−20	9.3	SW
La.	New Orleans	61.5	7	9.6	N
	Shreveport	56.2	−5	7.7	SE
Me.	Eastport	31.1	−23	13.8	W
	Portland	33.6	−17	10.1	NW
Md.	Baltimore	43.6	−7	7.2	NW
Mass.	Boston	37.6	−13	11.7	W
Mich.	Alpena	29.1	−27	11.3	W
	Detroit	35.4	−24	13.1	SW
	Marquette	27.6	−27	11.4	NW
Minn.	Duluth	25.1	−41	11.1	SW
	Minneapolis	29.6	−33	11.5	NW
Miss.	Vicksburg	56.0	−1	7.6	SE
Mo.	St. Joseph	40.3	−24	9.1	NW
	St. Louis	43.3	−22	11.8	NW
	Springfield	43.0	−29	11.3	SE
Mont.	Billings	34.7	−49	....	W
	Havre	27.7	−57	8.7	SW
Nebr.	Lincoln	37.0	−29	10.9	N
	North Platte	34.6	−35	9.0	W

* Reprinted by courtesy of the A. S. H. & V. E.

*Outside Temperatures and Wind Velocities Compiled from U. S. Weather Bureau Records

Col. A State	Col. B City	Col. C Average Temp., Oct. 1st–May 1st	Col. D Lowest Temperature	Col. E Average Wind Velocity Dec., Jan., Feb., M. per Hr.	Col. F Direction of Prevailing Wind, Dec., Jan., Feb.
Nev.	Tonopah	39.6	−7	9.9	SE
	Winnemucca	37.9	−28	9.5	NE
N. H.	Concord	33.4	−35	6.0	NW
N. J.	Atlantic City	41.6	−7	10.6	NW
N. Y.	Albany	35.1	−24	7.9	S
	Buffalo	34.7	−14	17.7	W
	New York	40.3	−6	13.3	NW
N. M.	Santa Fe	38.0	−13	7.3	NE
N. C.	Raleigh	49.7	−2	7.3	SW
	Wilmington	53.1	5	8.9	SW
N. D.	Bismarck	24.5	−45	...	NW
	Devil's Lake	18.9	−44	11.4	W
Ohio	Cleveland	36.9	−17	14.5	SW
	Columbus	39.9	−20	9.3	SW
Okla.	Oklahoma City	48.0	−17	12.0	N
Ore.	Baker	34.1	−20	6.0	SE
	Portland	45.9	−2	6.5	S.
Pa.	Philadelphia	41.9	−6	11.0	NW
	Pittsburgh	40.8	−20	13.7	NW
R. I.	Providence	37.6	−9	14.6	NW
S. C.	Charleston	56.9	7	11.0	N
	Columbia	53.7	−2	8.0	NE
S. D.	Huron	28.1	−43	11.5	NW
	Rapid City	32.3	−34	7.5	W
Tenn.	Knoxville	47.0	−16	6.5	SW
	Memphis	50.9	−9	9.6	NW
Texas	El Paso	53.0	−2	10.5	NW
	Fort Worth	54.7	−8	11.0	NW
	San Antonio	60.7	4	8.2	N
Utah	Modena	38.1	−24	8.9	W
	Salt Lake City	40.0	−20	4.9	SE
Vt.	Burlington	29.3	−27	12.9	S
Va.	Norfolk	49.1	2	9.0	N
	Lynchburg	45.2	−7	5.2	NW
	Richmond	47.4	−3	7.4	S
Wash.	Seattle	45.3	3	9.1	SE
	Spokane	37.5	−30	...	SW
W. Va.	Elkins	38.8	−21	4.8	W
	Parkersburg	41.9	−27	6.6	S
Wis.	Green Bay	28.6	−36	12.8	SW
	La Crosse	31.2	−43	5.6	NW
	Milwaukee	33.0	−25	11.7	W
Wyo.	Sheridan	31.0	−45	5.3	NW
	Lander	28.9	−36	3.0	NE

*Reprinted by courtesy of the A. S. H. & V. E.

Standard Table Showing Velocity and Force of Winds

Description	Miles per Hour	Feet per Minute	Feet per Second	Force in lbs. per sq. ft.
Perceptible	1	88	1.47	.005
Just perceptible	2	176	2.93	.020
	3	264	4.4	.044
Gentle breeze	4	352	5.87	.079
	5	440	7.33	.123
Pleasant breeze	10	880	14.67	.492
	15	1,320	22.0	1.107
Brisk wind	20	1,760	29.3	1.968
	25	2,200	36.6	3.075
High wind	30	2,640	44.0	4.428
	35	3,080	51.3	6.027
Very high wind	40	3,520	58.6	7.872
	45	3,960	66.0	9.963
Storm	50	4,400	73.3	12.300
Great storm	60	5,280	88.0	17.712
	70	6,160	102.7	24.108
Hurricane	80	7,040	117.3	31.488
	100	8,800	146.6	49.200

Air Supplied to Various Classes of Buildings

Reprinted from "Heating and Ventilating" by Allen and Walker.

	Cubic Feet per Hour per Occupant	No. of Air Changes
Churches, Assembly Rooms and Auditoriums	1200–1800	....
Theatres	600– 900	....
Grade Schools	1000–1500	....
High Schools	1800–2000	....
College Class Rooms	1500–2000	....
Hospitals for Ordinary Diseases	2500–3500	....
Hospitals for Children	2000–2500	....
Hospitals for Contagious Diseases	5000–5500	....
Hospitals for Wounded	3500–5000	....
Barracks	1000–1800	....
Living Rooms in Residences	1200	1 to 2
Stairways and Halls	600	½ to 1
Bed Rooms	1000	1½
Workshops	600–2000	....
Public Waiting Rooms	....	4
Public Toilet Rooms	....	20
Small Convention Halls	....	4
General Offices	....	3
Private Offices	....	4
Public Dining Rooms	....	4
Banquet Halls	....	5
Basement Restaurants	....	8 to 12
Hotel Kitchens	....	10 to 20
Public Libraries	....	3
Textile Mills	....	4
Engine Rooms	....	10 to 20
Boiler Rooms	....	10 to 20
Railroad Round Houses	....	12

Properties of Dry Air

Barometric Pressure 29.921 Inches

Reprinted from Fan Engineering (Buffalo Forge Company)

Temperature Degrees Fahrenheit	Weight per Cubic Foot. Pounds	Per Cent of Volume at 70 Degrees Fahrenheit	B.t.u. Absorbed by One Cubic Foot Dry Air per Degree Fahrenheit	Cubic Feet Dry Air Warmed One Degree per B.t.u.	Temperature Degrees Fahrenheit	Weight per Cubic Foot. Pounds	Per cent of Volume at 70 Degrees Fahrenheit	B.t.u. Absorbed by One Cubic Foot Dry Air per Degree Fahrenheit	Cubic Feet Dry Air Warmed One Degree per B.t.u.
0	.08636	.8680	.02080	48.08	130	.06732	1.1133	.01631	61.32
5	.08544	.8772	.02060	48.55	135	.06675	1.1230	.01618	61.81
10	.08453	.8867	.02039	49.05	140	.06620	1.1320	.01605	62.31
15	.08363	.8962	.02018	49.56	145	.06565	1.1417	.01592	62.82
20	.08276	.9057	.01998	50.05	150	.06510	1.1512	.01578	63.37
25	.08190	.9152	.01997	50.58	160	.06406	1.1700	.01554	64.35
30	.08107	.9246	.01957	51.10	170	.06304	1.1890	.01530	65.36
35	.08025	.9346	.01938	51.60	180	.06205	1.2080	.01506	66.40
40	.07945	.9434	.01919	52.11	190	.06110	1.2270	.01484	67.40
45	.07866	.9530	.01900	52.64	200	.06018	1.2455	.01462	68.41
50	.07788	.9624	.01881	53.17	220	.05840	1.2833	.01419	70.48
55	.07713	.9718	.01863	53.68	240	.05673	1.3212	.01380	72.46
60	.07640	.9811	.01846	54.18	260	.05516	1.3590	.01343	74.46
65	.07567	.9905	.01829	54.68	280	.05367	1.3967	.01308	76.46
70	.07495	1.0000	.01812	55.19	300	.05225	1.4345	.01274	78.50
75	.07424	1.0095	.01795	55.72	350	.04903	1.5288	.01197	83.55
80	.07356	1.0190	.01779	56.21	400	.04618	1.6230	.01130	88.50
85	.07289	1.0283	.01763	56.72	450	.04364	1.7177	.01070	93.46
90	.07222	1.0380	.01747	57.25	500	.04138	1.8113	.01018	98.24
95	.07157	1.0472	.01732	57.74	550	.03932	1.9060	.00967	103.42
100	.07093	1.0570	.01716	58.28	600	.03746	2.0010	.00923	108.35
105	.07030	1.0660	.01702	58.76	700	.03423	2.1900	.00847	118.07
110	.06968	1.0756	.01687	59.28	800	.03151	2.3785	.00782	127.88
115	.06908	1.0850	.01673	59.78	900	.02920	2.5670	.00728	137.37
120	.06848	1.0945	.01659	60.28	1000	.02720	2.7560	.00680	147.07
125	.06790	1.1040	.01645	60.79	1200	.02392	3.1335	.00603	165.83

Properties of Saturated Air

Weights of Air, Vapor of Water, and Saturated Mixture of Air and Vapor at Different Temperatures, Under Standard Atmospheric Pressure of 29.921 Inches of Mercury

Reprinted from Fan Engineering (Buffalo Forge Company)

Temperature Degrees Fahrenheit	Vapor Pressure Inches of Mercury	Weight in Cubic Feet of Mixture			B.t.u. Absorbed by One Cubic Foot Sat. Air per Degree F.	Cubic Foot Sat. Air Warmed One Degree per B.t.u.
		Weight of the Dry Air. Pounds	Weight of the Vapor. Pounds	Total Weight of the Mixture. Pounds		
1	2	3	4	5	6	7
0	.0383	.08625	.000069	.08632	.02082	48.04
10	.0631	.08433	.00011	.08444	.02039	49.05
20	.1030	.08247	.000177	.08265	.01998	50.05
30	.1640	.08063	.000276	.08091	.01955	51.15
40	.2477	.07880	.000409	.07921	.01921	52.06
50	.3625	.07694	.000587	.07753	.01883	53.11
60	.5220	.07506	.000829	.07589	.01852	54.00
70	.7390	.07310	.001152	.07425	.01811	55.22
80	1.0290	.07095	.001576	.07253	.01788	55.93
90	1.4170	.06881	.002132	.07094	.01763	56.72
100	1.9260	.06637	.002848	.06922	.01737	57.57
110	1.5890	.06367	.003763	.06743	.01716	58.27
120	3.4380	.06062	.004914	.06553	.01696	58.96
130	4.5200	.05716	.006357	.06352	.01681	59.50
140	5.8800	.05319	.008140	.06133	.01669	59.92
150	7.5700	.04864	.010310	.05894	.01663	60.14
160	9.6500	.04341	.012956	.05637	.01664	60.10
170	12.2000	.03735	.016140	.05349	.01671	59.85
180	15.2900	.03035	.019940	.05029	.01682	59.45
190	19.0200	.02227	.024465	.04674	.01706	58.80
200	23.4700	.01297	.029780	.04275	.01750	57.15

B.t.u. Required for Heating Air

This table specifies the quantity of heat in British thermal units required to raise one cubic foot of air through any given temperature interval.

External Temperature	Temperature of Air in Room									
	40°	50°	60°	70°	80°	90°	100°	110°	120°	130°
—40°	1.802	2.027	2.252	2.479	2.703	2.928	3.154	3.379	3.604	3.829
—30°	1.540	1.760	1.980	2.200	2.420	2.640	2.860	3.080	3.300	3.520
—20°	1.290	1.505	1.720	1.935	2.150	2.365	2.580	2.795	3.010	3.225
—10°	1.051	1.262	1.473	1.684	1.892	2.102	2.311	2.522	2.732	2.943
0°	0.822	1.028	1.234	1.439	1.645	1.851	2.056	2.262	2.467	2.673
10°	0.604	0.805	1.007	1.208	1.409	1.611	1.812	2.013	2.215	2.416
20°	0.393	0.590	0.787	0.984	1.181	1.378	1.575	1.771	1.968	2.165
30°	0.192	0.385	0.578	0.770	0.963	1.155	1.345	1.540	1.733	1.925
40°	0.000	0.188	0.376	0.564	0.752	0.940	1.128	1.316	1.504	1.692
50°	.....	0.000	0.184	0.367	0.551	0.735	0.918	1.102	1.286	1.470
60°	.....	.....	0.000	0.179	0.359	0.538	0.718	0.897	1.077	1.256
70°	.....	.....	.....	0.000	0.175	0.350	0.525	0.700	0.875	1.049

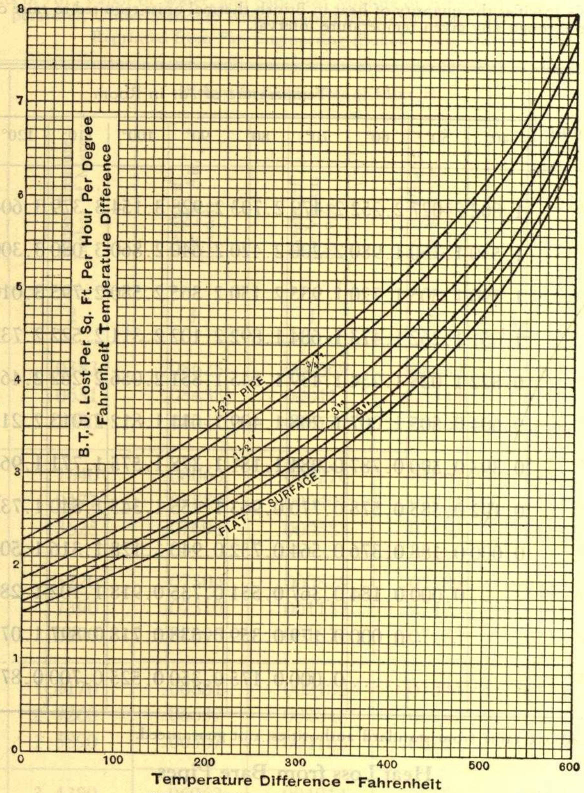
NOTE.—Above table from standard authorities, not guaranteed.

Heat Loss from Bare Pipes

From chart, page F58, the number of B.t.u. lost per square foot per hour per degree Fahrenheit temperature difference can be obtained for various sizes of bare pipe for various temperature differences between steam inside and air surrounding the pipe.

For example: To determine B.t.u. loss per square foot per degree per hour difference in temperature from 1½ inch pipe with a temperature difference of 150 degrees Fahrenheit, proceed as follows: at 150 degrees Fahrenheit temperature difference, follow the vertical line to intersection of curve for 1½ inch pipe and read at left hand side of chart 2.65 B.t.u. loss per square foot per hour per degree difference of temperature.

HEAT LOSS FROM PIPING



HEAT LOSS FROM BARE PIPES

*Effect of Painting 32-Inch Three-Column, 6-Section Cast Iron Radiators

Radiator No.	Finish	Area Square Feet	Coefficient of Heat Trans. B.t.u.	Relative Heating Value Per Cent
1	Bare iron, foundry finish.....	27	1.77	100.5
2	One coat of aluminum bronze.	27	1.60	90.8
3	Gray paint dipped..........	27	1.78	101.1
4	One coat dull black Pecora paint	27	1.76	100.0

*Reprinted by courtesy of A. S. H. & V. E.

Surface Area of Pipe

EXTERNAL SURFACE OF VARIOUS SIZES AND LENGTHS OF PIPE

Length of Pipe	Size of Pipe—Inches,—Area Square Feet											
	¾	1	1¼	1½	2	2½	3	4	5	6	7	8
1	.275	.346	.434	.494	.622	.753	.916	1.175	1.455	1.739	1.996	2.257
2	.5	.7	.9	1.	1.2	1.5	1.8	2.4	2.9	3.5	4.	4.5
3	.8	1.	1.3	1.5	1.9	2.3	2.7	3.5	4.4	5.2	6.	6.8
4	1.1	1.4	1.7	2.	2.5	3.	3.6	4.7	5.8	7.	8.	9.
5	1.4	1.7	2.2	2.4	3.1	3.8	4.6	5.8	7.3	7.7	10.	11.3
6	1.6	2.1	2.6	2.9	3.7	4.5	5.5	7.	8.7	10.5	12.	13.5
7	1.9	2.4	3.	3.4	4.4	5.3	6.4	8.2	10.2	12.1	14.	15.8
8	2.2	2.8	3.5	3.9	5.	6.	7.3	9.4	11.6	13.9	16.	18.
9	2.5	3.1	3.9	4.4	5.6	6.8	8.2	10.6	13.1	15.7	18.	20.3
10	2.7	3.5	4.3	4.9	6.2	7.5	9.1	11.8	14.6	17.4	20.	22.6
11	3.	3.8	4.8	5.4	6.8	8.3	10.	12.9	16.	19.1	22.	24.9
12	3.3	4.1	5.2	5.9	7.5	9.	11.	14.1	17.4	20.9	24.	27.1
13	3.6	4.5	5.6	6.4	8.1	9.8	11.9	15.3	18.9	22.6	26.	29.4
14	3.8	4.8	6.1	6.9	8.7	10.5	12.8	16.5	20.3	24.3	28.	31.6
15	4.1	5.2	6.5	7.4	9.3	11.3	13.7	17.6	21.8	26.1	30.	33.9
16	4.4	5.5	6.9	7.9	10.	12.	14.6	18.8	23.2	27.8	32.	36.1
17	4.7	5.9	7.4	8.4	10.6	12.8	15.5	20.	24.7	29.5	34.	38.4
18	5.	6.2	7.8	8.9	11.2	13.5	16.5	21.2	26.2	31.3	36.	40.6
19	5.2	6.6	8.3	9.4	11.8	14.3	17.4	22.3	27.6	33.1	38.	42.9
20	5.5	6.9	8.7	9.9	12.5	15.	18.3	23.5	29.1	34.8	40.	45.2
21	5.8	7.3	9.1	10.4	13.	15.8	19.2	24.7	30.5	36.5	42.	47.4
22	6.	7.6	9.6	10.9	13.7	16.5	20.2	25.9	32.	38.3	44.	49.7
23	6.3	8.	10.	11.3	14.3	17.3	21.1	27.	33.5	40.	46.	52.
24	6.6	8.3	10.4	11.9	14.9	18.	22.	28.2	34.9	41.7	48.	54.2
25	6.9	8.6	10.9	12.3	15.6	18.8	22.9	29.3	36.3	43.5	50.	56.4
26	7.1	9.	11.3	12.8	16.2	19.5	23.8	30.5	37.8	45.2	52.	58.6
27	7.4	9.4	11.7	13.3	16.8	20.3	24.7	31.7	39.3	47.	54.	61.
28	7.7	9.7	12.2	13.8	17.4	21.	25.6	32.9	40.7	48.7	56.	63.2
29	8.	10.	12.6	14.3	18.	21.8	26.6	34.1	42.2	50.4	58.	65.5
30	8.3	10.4	13.	14.8	18.7	22.5	27.5	35.3	43.6	52.1	60.	67.7
31	8.5	10.7	13.5	15.3	19.3	23.3	28.4	36.4	45.1	53.9	62.	70.
32	8.8	11.1	13.9	15.8	19.9	24.1	29.3	37.6	46.5	55.6	64.	72.2
33	9.1	11.4	14.3	16.3	20.5	24.8	30.2	38.8	48.	57.4	66.	74.4
34	9.4	11.7	14.7	16.8	21.2	25.6	31.1	40.	49.5	59.1	68.	76.7
35	9.6	12.1	15.2	17.3	21.8	26.3	32.	41.1	50.9	60.8	70.	79.
36	9.9	12.5	15.6	17.8	22.4	27.	33.	42.3	52.4	62.6	72.	81.3
37	10.2	12.8	16.1	18.3	23.	27.8	33.9	43.5	53.8	64.3	74.	83.5
38	10.5	13.2	16.5	18.8	23.7	28.5	34.8	44.6	55.2	66.	76.	85.8
39	10.7	13.5	16.9	19.3	24.3	29.3	35.7	45.8	56.7	67.8	78.	88.
40	11.	13.8	17.4	19.8	24.9	30.1	36.6	47.	58.2	69.5	80.	90.2
41	11.3	14.2	17.8	20.3	25.5	30.8	37.6	48.2	59.6	71.3	82.	92.5
42	11.5	14.5	18.2	20.8	26.1	31.6	38.5	49.4	61.1	73.	84.	94.8
43	11.8	14.9	18.7	21.3	26.8	32.3	39.4	50.6	62.5	74.8	86.	97.
44	12.1	15.2	19.1	21.8	27.4	33.1	40.3	51.7	64.	76.5	88.	99 3
45	12.4	15.6	19.5	22.2	28.	33.8	41.2	52.9	65.5	78.2	90.	101 6
46	12.7	15.9	20.	22.7	28.6	34.6	42.2	54.	67.	80.	92.	103.8
47	12.9	16.3	20.4	23.2	29.2	35.3	43.	55.2	68.4	81.7	94.	106.
48	13.2	16.6	20.8	23.7	29.9	36.1	43.9	56.4	69.8	83.5	96.	108.4
49	13.5	17.	21.3	24.2	30.5	36.8	44.8	57.6	71.2	85.1	98.	110.5
50	13.8	17.3	21.7	24.7	31.1	37.6	45.8	58.7	72.7	87.	100.	112.8

Note—Above information is quoted from standard authorities. Not guaranteed.

Equalization of Pipe Area

(Babcock and Wilcox)

* Diameter of Pipes, Inches	Number of Smaller Pipes Equivalent to One Larger Pipe					
	¾ Inch	1 Inch	1½ Inch	2 Inch	3 Inch	4 Inch
½	2.27	4.88	15.8	31.7	96.9	205
¾	1	2.05	6.9	14	42.5	90.4
1	....	1	3.5	6.8	20.9	44.1
1½	....	....	1	1.3	6.1	13
2	....	....	....	1	3.1	6.5
2½	....	....	....	....	1.8	3.87
3	....	....	....	....	1	2.12
4	....	....	....	....	....	1
5	....	....	....	....	....	......
6	....	....	....	....	....	......
7	....	....	....	....	....	......
8	....	....	....	....	....	......

* Diameter of Pipes, Inches	Number of Smaller Pipes Equivalent to One Larger Pipe					
	5 Inch	6 Inch	7 Inch	8 Inch	9 Inch	10 Inch
½	377	620	918	.....	.....	.....
¾	166	273	405	569	779	.....
1	81.1	133	198	278	380	536
1½	23.8	39.2	58.1	81.7	112	157
2	11.9	19.6	29.0	40.8	55.8	78.5
2½	7.1	11.7	17.4	24.4	33.4	47.0
3	3.9	6.4	9.5	13.3	20.9	23.7
4	1.8	3	4.5	6.3	8.6	12.1
5	1	1.6	2.4	3.4	4.7	6.6
6	.....	1	1.5	2.1	2.8	4.0
7	.....	.....	1	1.4	1.9	2.7
8	.....	.....	.....	1	1.3	1.9

* Nominal diameters standard steam- and gas-pipes.

EXAMPLE: To find number of 2-inch pipes which will deliver as much fluid as one 5-inch pipe: In column headed 5, and opposite 2 read 11.9 which is the equivalent number of 2-inch pipes.

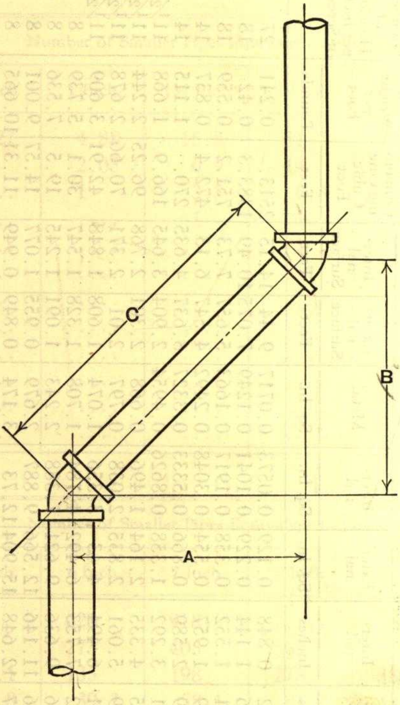
PIPE DATA

Wrought Iron Welded Steam, Gas and Water Pipe

Table of Standard Dimensions

Diameter			Thickness	Circumference		Transverse Areas			Length of Pipe per Sq. Ft. of		Length of Pipe Containing One Cubic Foot	Nominal Weight per Foot	Number of Threads per Inch of Screw	Tap Drill
Nominal Internal	Actual External	Actual Internal		External	Internal	External	Internal	Metal	External Surface	Internal Surface				
Inches	Inches	Inches	Inches	Inches	Inches	Sq. In.	Sq. In.	Sq. In.	Feet	Feet	Feet	Pounds		
1/8	0.405	0.27	0.068	1.272	0.848	0.129	0.0573	0.0717	9.44	14.15	2513.	0.241	27	11/32
1/4	0.54	0.364	0.088	1.696	1.144	0.229	0.1041	0.1249	7.075	10.49	1383.3	0.42	18	7/16
3/8	0.675	0.494	0.091	2.121	1.552	0.358	0.1917	0.1663	5.657	7.73	751.2	0.559	18	9/16
1/2	0.84	0.623	0.109	2.639	1.957	0.554	0.3048	0.2492	4.547	6.13	472.4	0.837	14	11/16
3/4	1.05	0.824	0.113	3.299	2.589	0.866	0.5333	0.3327	3.637	4.635	270.	1.115	14	15/16
1	1.315	1.048	0.134	4.131	3.292	1.358	0.8626	0.4954	2.904	3.645	166.9	1.668	11½	1 3/16
1¼	1.66	1.38	0.14	5.215	4.335	2.164	1.496	0.668	2.301	2.768	96.25	2.244	11½	1½
1½	1.9	1.611	0.145	5.969	5.061	2.835	2.038	0.797	2.01	2.371	70.66	2.678	11½	1¾
2	2.375	2.067	0.154	7.461	6.494	4.43	3.356	1.074	1.608	1.848	42.91	3.609	11½	2¼
2½	2.875	2.468	0.204	9.032	7.753	6.492	4.784	1.708	1.328	1.547	30.1	5.739	8	2 11/16
3	3.5	3.067	0.217	10.996	9.636	9.621	7.388	2.243	1.091	1.245	19.5	7.536	8	3 5/16
3½	4.	3.548	0.226	12.566	11.146	12.566	9.887	2.679	0.955	1.077	14.57	9.001	8	3 13/16
4	4.5	4.026	0.237	14.137	12.648	15.904	12.73	3.174	0.849	0.949	11.31	10.665	8	4 5/16
4½	5.	4.508	0.246	15.708	14.162	19.635	15.961	3.674	0.764	0.848	9.02	12.34	8	...
5	5.563	5.045	0.259	17.477	15.849	24.306	19.99	4.316	0.687	0.757	7.2	14.502	8	...
6	6.625	6.065	0.28	20.813	19.054	34.472	28.888	5.584	0.577	0.63	4.98	18.762	8	...
7	7.625	7.023	0.301	23.955	22.063	45.664	38.738	6.926	0.501	0.544	3.72	23.271	8	...
8	8.625	7.982	0.322	27.096	25.076	58.426	50.04	8.386	0.443	0.478	2.88	28.177	8	...
9	9.625	8.937	0.344	30.238	28.076	72.76	62.73	10.03	0.397	0.427	2.29	33.701	8	...
10	10.75	10.019	0.366	33.772	31.477	90.763	78.839	11.924	0.355	0.382	1.82	40.065	8	...

Simple Rules for Pipe Offset Calculations



Multiply 1st Dimension by Factor to Obtain Second Dimension	Factor for			
	22½° Ells	30° Ells	45° Ells	60° Ells
a x Factor = b	2,414	1,732	1,000	0,577
a x Factor = c	2,613	2,000	1,414	1,155
b x Factor = a	0,414	0,577	1,000	1,732
b x Factor = c	1,082	1,155	1,414	2,000
c x Factor = a	0,383	0,500	0,707	0,866
c x Factor = b	0,924	0,866	0,707	0,500

U. S. Standard Gauge for Sheet and Plate Iron and Steel

Number of Gauge	Approximate Thickness in Fractions of an Inch	Approximate Thickness in Decimal Parts of an Inch	Approximate Thickness in Millimeters	Weight Per Square Foot in Ounces Avoirdupois	Weight Per Square Foot in Pounds Avoirdupois	Weight Per Square Foot in Kilograms	Weight Per Square Meter in Kilograms	Weight Per Square Meter in Pounds Avoirdupois
0000000	1-2	0.5	12.7	320	20.	9.072	97.65	215.28
000000	15-32	0.46875	11.90625	300	18.75	8.505	91.55	201.82
000000	7-16	0.4375	11.1125	280	17.50	7.938	85.44	188.37
0000	13-32	0.40625	10.31875	260	16.25	7.371	79.33	174.91
000	3-8	0.375	9.525	240	15.	6.804	73.24	161.46
00	11-32	0.34375	8.73125	220	13.75	6.237	67.13	148.00
0	5-16	0.3125	7.9375	200	12.50	5.67	61.03	134.55
1	9-32	0.28125	7.14375	180	11.25	5.103	54.93	121.09
2	17-64	0.265625	6.746875	170	10.625	4.819	51.88	114.37
3	1-4	0.25	6.35	160	10.	4.536	48.82	107.64
4	15-64	0.234375	5.953125	150	9.375	4.252	45.77	100.91
5	7-32	0.21875	5.55625	140	8.75	3.969	42.72	94.18
6	13-64	0.203125	5.159375	130	8.125	3.685	39.67	87.45
7	3-16	0.1875	4.7625	120	7.5	3.402	36.62	80.72
8	11-64	0.171875	4.365625	110	6.875	3.118	33.57	74.00
9	5-32	0.15625	3.96875	100	6.25	2.835	30.52	67.27
10	9-64	0.140625	3.571875	90	5.625	2.552	27.46	60.55
11	1-8	0.125	3.175	80	5.	2.268	24.41	53.82
12	7-64	0.109375	2.778125	70	4.375	1.984	21.36	47.09
13	3-32	0.09375	2.38125	60	3.75	1.701	18.31	40.36
14	5-64	0.078125	1.984375	50	3.125	1.417	15.26	33.64
15	9-128	0.0703125	1.7859375	45	2.8125	1.276	13.73	30.27
16	1-16	0.0625	1.5875	40	2.5	1.134	12.21	26.91
17	9-160	0.05625	1.42875	36	2.25	1.021	10.99	24.22
18	1-20	0.05	1.27	32	2.	0.9072	9.765	21.53
19	7-160	0.04375	1.11125	28	1.75	0.7938	8.544	18.84
20	3-80	0.0375	0.9525	24	1.50	0.6804	7.324	16.15
21	11-320	0.034375	0.873125	22	1.375	0.6237	6.713	14.80
22	1-32	0.03125	0.793750	20	1.25	0.567	6.103	13.46
23	9-320	0.028125	0.714375	18	1.125	0.5103	5.49	12.11
24	1-40	0.025	0.635	16	1.	0.4536	4.882	10.76
25	7-320	0.021875	0.555625	14	0.875	0.3969	4.272	9.42
26	3-160	0.01875	0.47625	12	0.75	0.3402	3.662	8.07
27	11-640	0.0171875	0.4365625	11	0.6875	0.3119	3.357	7.40
28	1-64	0.015625	0.396875	10	0.625	0.2835	3.052	6.73
29	9-640	0.0140625	0.3571875	9	0.5625	0.2551	2.746	6.05
30	1-80	0.0125	0.3175	8	0.5	0.2268	2.441	5.38
31	7-640	0.0109375	0.2778125	7	0.4375	0.1984	2.136	4.71
32	13-1280	0.01015625	0.25796875	6½	0.40625	0.1843	1.983	4.37
33	3-320	0.009375	0.238125	6	0.375	0.1701	1.831	4.04
34	11-1280	0.00859375	0.21828125	5½	0.34375	0.1559	1.678	3.70
35	5-640	0.0078125	0.1984375	5	0.3125	0.1417	1.526	3.36
36	9-1280	0.00703125	0.17859375	4½	0.28125	0.1276	1.373	3.03
37	17-2560	0.00664062	0.16867187	4¼	0.26562	0.1205	1.297	2.87
38	1-160	0.00625	0.15875	4	0.25	0.1134	1.221	2.69

Properties of Water

Temp. Deg. Fahr.	Weight, per Cu. Ft. Lbs.	Heat of the Liquid B.t.u.	Temp. Deg. Fahr.	Weight, per Cu. Ft. Lbs.	Heat of the Liquid B.t.u.	Temp. Deg. Fahr.	Weight, per Cu. Ft. Lbs.	Heat of the Liquid B.t.u.
32	62.42	0.00	123	61.68	90.90	168	60.81	135.86
35	62.42	3.02	124	61.67	91.90	169	60.79	136.86
40	62.42	8.05	125	61.65	92.90	170	60.77	137.87
45	62.42	13.07	126	61.63	93.90	171	60.75	138.87
50	62.41	18.08	127	61.61	94.89	172	60.73	139.87
52	62.40	20.08	128	61.60	95.89	173	60.70	140.87
54	62.40	22.08	129	61.58	96.89	174	60.68	141.87
56	62.39	24.08	130	61.56	97.89	175	60.66	142.87
58	62.38	26.08	131	61.54	98.89	176	60.64	143.87
60	62.37	28.08	132	61.52	99.88	177	60.62	144.88
62	62.36	30.08	133	61.51	100.88	178	60.59	145.88
64	62.35	32.07	134	61.49	101.88	179	60.57	146.88
66	62.34	34.07	135	61.47	102.88	180	60.55	147.88
68	62.33	36.07	136	61.45	103.88	181	60.53	148.88
70	62.31	38.06	137	61.43	104.87	182	60.50	149.89
72	62.30	40.05	138	61.41	105.87	183	60.48	150.89
74	62.28	42.05	139	61.39	106.87	184	60.46	151.89
76	62.27	44.04	140	61.37	107.87	185	60.44	152.89
78	62.25	46.04	141	61.36	108.87	186	60.41	153.89
80	62.23	48.03	142	61.34	109.87	187	60.39	154.90
82	62.21	50.03	143	61.32	110.87	188	60.37	155.90
84	62.19	52.02	144	61.30	111.87	189	60.34	156.90
86	62.17	54.01	145	61.28	112.86	190	60.32	157.91
88	62.15	56.01	146	61.26	113.86	191	60.29	158.91
90	62.13	58.00	147	61.24	114.86	192	60.27	159.91
92	62.11	60.00	148	61.22	115.86	193	60.25	160.91
94	62.09	61.99	149	61.20	116.86	194	60.22	161.92
96	62.07	63.98	150	61.18	117.86	195	60.20	162.92
98	62.05	65.98	151	61.16	118.86	196	60.17	163.92
100	62.02	67.97	152	61.14	119.86	197	60.15	164.93
102	62.00	69.96	153	61.12	120.86	198	60.12	165.93
104	61.97	71.96	154	61.10	121.86	199	60.10	166.94
106	61.95	73.95	155	61.08	122.86	200	60.07	167.94
108	61.92	75.95	156	61.06	123.86	201	60.05	168.94
110	61.89	77.94	157	61.04	124.86	202	60.02	169.95
112	61.86	79.93	158	61.02	125.86	203	60.00	170.95
114	61.83	81.93	159	61.00	126.86	204	59.97	171.96
115	61.82	82.92	160	60.98	127.86	205	59.95	172.96
116	61.80	83.92	161	60.96	128.86	206	59.92	173.97
117	61.78	84.92	162	60.94	129.86	207	59.89	174.97
118	61.77	85.92	163	60.92	130.86	208	59.87	175.98
119	61.75	86.91	164	60.90	131.86	209	59.84	176.98
120	61.74	87.91	165	60.87	132.86	210	59.82	177.99
121	61.72	88.91	166	60.85	133.86	211	59.79	178.99
122	61.70	89.91	167	60.83	134.86	212	59.76	180.00

Note.—Above information is quoted from standard authorities. Not guaranteed.

PROPERTIES OF SATURATED STEAM

Boiling Temp.	Absolute Press. # the Sq. In.	Inches Vacuum	Steam Gauge Press. Lbs.	Latent Heat	Heat Liquid	Vol. 1 lb. Steam Cu. Ft.
157	4.408	20.94	....	1003.4	124.86	82.6
161	4.851	20.04	....	1001.6	127.86	77.2
165	5.333	19.06	....	998.7	132.86	69.1
169	5.855	18.00	....	996.4	136.86	63.3
172	6.273	17.15	....	994.6	139.87	59.4
176	6.867	15.94	....	992.3	143.87	54.5
179	7.344	14.97	....	990.5	146.88	51.2
182	7.85	13.94	....	988.7	149.89	48.12
185	8.38	12.85	....	986.9	152.89	45.25
187	8.76	12.09	....	985.7	154.90	43.45
190	9.34	10.90	....	983.9	157.91	40.91
192	9.74	10.09	....	982.7	159.91	39.31
194	10.17	9.21	....	981.5	161.92	37.78
197	10.83	7.87	....	979.7	164.93	35.62
199	11.29	6.93	....	978.8	166.94	34.26
201	11.76	5.97	....	977.2	168.94	32.96
203	12.26	4.96	....	976.0	170.95	31.72
205	12.77	3.92	....	974.7	172.96	30.53
207	13.30	2.84	....	973.5	174.97	29.39
209	13.85	1.73	....	972.2	176.98	28.32
210	14.13	1.16	....	971.6	177.99	27.80
212	14.70	....	....	970.4	180.00	26.79
215	15.60	....	0.90	968.4	183.00	25.35
217	16.22	....	1.72	967.2	185.00	24.44
219	16.86	....	2.16	965.9	187.10	23.57
222	17.87	....	3.17	963.9	190.10	22.34
225	18.91	....	4.21	962.0	193.10	21.17
227	19.64	....	4.94	960.7	195.20	20.44
230	20.77	....	6.07	958.7	198.20	19.39
232	21.56	....	6.86	957.4	200.20	18.72
235	22.79	....	8.09	955.4	203.2	17.78
237	23.64	....	8.94	954.1	205.3	17.17
240	24.97	....	10.27	952.1	208.3	16.32
242	25.88	....	11.18	950.7	210.3	15.78
244	26.83	....	12.13	949.4	212.4	15.26
246	27.80	....	13.10	948.0	214.4	14.76
248	28.80	....	14.10	946.7	216.4	14.28
250	29.82	....	15.12	945.3	218.5	13.82
252	30.88	....	16.18	943.9	220.5	13.37
255	32.53	....	17.83	941.9	223.5	12.74
257	33.66	....	18.96	940.5	225.6	12.34
259	34.83	....	20.13	939.1	227.6	11.95

Showing Cubic Air Content of Rooms of Various Dimensions

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	WIDTH AND LENGTH OF ROOM (FEET)														
	3x16½	4x18¾	5x20	6x21	7x21½	8x22	9x22	10x22½	11x23	12x23	13x23	14x23	15x23	16x23½	17x23½
	4x12½	5x15	6x16½	7x18	8x18¾	9x19½	10x20	11x20½	12x21	13x21	14x21½	15x22	16x22	17x22	18x22½
	5x10	6x12½	7x14½	8x15½	9x16½	10x17½	11x18	12x18¾	13x19	14x20	15x20	16x20	17x20½	18x21½	19x21½
	6x8½	7x10½	8x12½	9x14	10x15	11x16	12x16½	13x17¼	14x18	15x18	16x18½	17x19½	18x19½	19x20½	20x20
	7x7	8x9½	9x11	10x12½	11x13½	12x14½	13x15½	14x16	15x16½	16x17½	17x17½	18x18	19x18	20x19	21x19
	8x6½	9x8½	10x10	11x11½	12x12½	13x13½	14x14½	15x15	16x15	17x16	18x16	19x17	20x17	21x18	22x18
Height of Ceiling	CUBIC CONTENT (CUBIC FEET)														
8	400	600	800	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200
8½	425	640	850	1060	1275	1490	1700	1910	2125	2340	2550	2760	2975	3190	3400
9	450	675	900	1125	1350	1575	1800	2020	2250	2480	2700	2920	3150	3370	3600
9½	475	715	950	1190	1425	1660	1900	2140	2375	2610	2850	3090	3325	3560	3800
10	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3250	3500	3750	4000
10½	525	790	1050	1310	1575	1840	2100	2360	2625	2890	3150	3420	3675	3940	4200
11	550	825	1100	1375	1650	1925	2200	2480	2750	3030	3300	3580	3850	4130	4400
11½	575	860	1150	1440	1725	2010	2300	2600	2875	3170	3450	3740	4025	4310	4600
12	600	900	1200	1500	1800	2100	2400	2700	3000	3300	3600	3900	4200	4500	4800
12½	625	940	1250	1560	1875	2190	2500	2820	3125	3440	3750	4070	4375	4690	5000
13	650	980	1300	1625	1950	2280	2600	2930	3250	3580	3900	4240	4550	4880	5200

Example. To find cubic content of a room 10 feet wide by 10 feet long and 9 feet high proceed as follows: Locate in top table width and length dimensions of room (10x10); read directly down in this same column opposite the ceiling height 9 (feet) shown at left hand side of page. The cubic content of room is 900 cubic feet.

Full Area of Two-Pane Windows

Giving the Total Area of Two-Pane Windows, Including the Sash

W'th Glass In.	Width of Opening Ft. In.	Height Glass	18″	20″	22″	24″	26″	28″	30″	32″	34″	36″	38″	40″	42″	44″	46″	48″	50″	52″
		Height Opening	3′-6″	3′-10″	4′-2″	4′-6″	4′-10″	5′-2″	5′-6″	5′-10″	6′-2″	6′-6″	6′-10″	7′-2″	7′-6″	7′-10″	8′-2″	8′-6″	8′-10″	9′-2″
16	1– 8	Standard sizes of two-light windows	5.8	6.4	7.0	7.5	8.0	8.6	9.2	9.7	10.3	10.8	11.4	11.9	12.5	13.0	13.6	14.2	14.7	15.2
18	1–10		6.4	7.0	7.6	8.2	8.9	9.5	10.1	10.7	11.3	11.9	12.5	13.1	13.7	14.3	15.0	15.6	16.2	16.8
20	2– 0		7.0	7.7	8.3	9.0	9.7	10.3	11.0	11.7	12.3	13.0	13.6	14.3	15.0	15.6	16.3	17.0	17.7	18.3
22	2– 2		7.6	8.3	9.0	9.7	10.5	11.2	11.9	12.6	13.4	14.0	14.7	15.5	16.2	17.0	17.7	18.4	19.2	19.8
24	2– 4		8.2	8.9	9.7	10.5	11.3	12.0	12.8	13.6	14.4	15.1	15.9	16.7	17.4	18.2	19.0	19.8	20.6	21.4
26	2– 6		8.7	9.6	10.4	11.2	12.0	12.8	13.7	14.6	15.4	16.2	17.1	17.9	18.7	19.5	20.4	21.2	22.0	23.0
28	2– 8		9.3	10.2	11.1	12.0	12.9	13.8	14.7	15.5	16.4	17.3	18.2	19.1	20.0	20.8	21.8	22.6	23.5	24.4
30	2–10		10.0	10.8	11.8	12.8	13.7	14.6	15.6	16.5	17.5	18.4	19.3	20.3	21.2	22.2	23.2	24.0	25.0	26.0
32	3– 0		10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5	18.5	19.5	20.5	21.5	22.5	23.5	24.5	25.5	26.5	27.5
34	3– 2		11.0	12.1	13.2	14.3	15.3	16.4	17.4	18.5	19.5	20.6	21.6	22.6	23.7	24.8	25.8	27.0	28.0	29.0
36	3– 4		11.7	12.8	13.9	15.0	16.1	17.2	18.3	19.5	20.5	21.6	22.8	23.8	25.0	26.1	27.2	28.3	29.4	30.5
38	3– 6		12.2	13.4	14.6	15.8	16.9	18.0	19.2	20.4	21.6	22.7	24.0	25.0	26.2	27.4	28.6	29.8	31.0	32.1
40	3– 8		12.8	14.0	15.3	16.5	17.7	18.9	20.1	21.4	22.6	23.8	25.1	26.2	27.4	28.7	30.0	31.2	32.4	33.6
42	3–10		13.4	14.7	16.0	17.3	18.5	19.8	21.0	22.4	23.6	24.9	26.2	27.4	28.6	30.0	31.3	32.6	33.8	35.0
44	4– 0		14.0	15.3	16.7	18.0	19.3	20.7	22.0	23.4	24.6	26.0	27.3	28.6	30.0	31.3	32.6	34.0	35.3	36.5
46	4– 2		14.6	16.0	17.4	18.8	20.1	21.5	23.0	24.4	25.6	27.1	28.4	29.8	31.2	32.6	34.0	35.5	36.8	38.2
48	4– 4		15.2	16.6	18.0	19.5	20.9	22.4	23.8	25.3	26.7	28.1	29.5	31.0	32.4	34.0	35.4	36.8	38.3	39.6
50	4– 6		15.7	17.2	18.7	20.3	21.8	23.2	24.8	26.2	27.7	29.2	30.7	32.2	33.7	35.2	36.7	38.2	39.7	41.2
52	4– 8		16.3	17.9	19.4	21.0	22.5	24.0	25.6	27.2	28.7	30.3	31.8	33.4	35.0	36.5	38.0	39.6	41.2	42.7
54	4–10		16.9	18.5	20.1	21.8	23.4	25.0	26.6	28.2	29.8	31.4	32.9	34.6	36.2	37.8	39.5	41.0	42.7	44.3
56	5– 0		17.5	19.3	20.8	22.5	24.2	25.8	27.5	29.0	30.8	32.5	34.0	35.8	37.5	39.8	40.8	42.5	44.2	46.0

Square Feet of Wall Surface Ordinarily Found in House Heating

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Height of Ceiling	RUNNING FEET OF EXPOSED WALL WITHOUT REGARD TO WINDOW OPENINGS																		
	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
8	48	56	64	72	80	88	96	104	112	120	128	136	144	152	160	168	176	184	192
8½	51	60	68	76	85	94	102	110	119	127	136	145	153	162	170	178	187	195	204
9	54	63	72	81	90	99	108	117	126	135	144	153	162	171	180	189	198	207	216
9½	57	66	76	86	95	105	114	123	133	142	152	161	171	181	190	200	209	218	228
10	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240
10½	63	73	84	94	105	115	126	136	147	157	168	178	189	199	210	220	231	242	252
11	66	77	88	99	110	121	132	143	154	165	176	187	198	209	220	231	242	253	264
11½	69	80	92	104	115	126	138	149	161	172	184	195	207	218	230	241	253	265	276
12	72	84	96	108	120	132	144	156	168	180	192	204	216	228	240	252	264	276	288
12½	75	87	100	112	125	137	150	162	175	187	200	212	225	238	250	262	275	287	300
13	78	91	104	117	130	143	156	169	181	195	208	221	234	247	260	273	286	299	312
14	84	98	112	126	140	154	168	182	196	210	224	238	252	266	280	294	308	322	336
Height of Ceiling	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
8	200	208	216	224	232	240	248	256	264	272	280	288	296	304	312	320	328	336	344
8½	212	221	230	238	246	255	263	272	280	289	298	306	315	323	332	340	349	357	366
9	225	234	243	252	261	270	279	288	297	306	315	324	333	342	351	360	369	378	387
9½	237	247	256	266	275	285	294	304	313	323	332	342	351	361	370	380	389	399	408
10	250	260	270	280	290	300	310	320	330	340	350	360	370	380	390	400	410	420	430
10½	262	273	283	294	305	315	325	336	346	357	367	378	388	399	409	420	430	441	451
11	275	286	297	308	319	330	341	352	363	374	385	396	407	418	429	440	451	462	473
11½	287	299	310	322	333	345	356	368	379	391	403	414	426	437	449	460	471	483	494
12	300	312	324	336	348	360	372	384	396	408	420	432	444	456	468	480	492	504	516
12½	312	325	337	350	362	375	387	400	412	425	437	450	462	475	487	500	512	525	537
13	325	338	351	364	377	390	403	416	429	442	455	468	481	494	507	520	533	546	559
14	350	364	378	392	406	420	434	448	462	476	490	504	518	532	546	560	574	588	602

Areas of Circles

Diameter	Area	Diameter	Area	Diameter	Area	Diameter	Area
⅛	0.0123	10	78.54	30	706.86	65	3318.3
¼	0.0491	½	86.59	31	754.76	66	3421.2
⅜	0.1104	11	95.03	32	804.24	67	3525.6
½	0.1963	½	103.86	33	855.30	68	3631.6
⅝	0.3067	12	113.09	34	907.92	69	3739.2
¾	0.4417	½	122.71	35	962.11	70	3848.4
⅞	0.6013	13	132.73	36	1017.8	71	3959.2
1	0.7854	½	143.13	37	1075.2	72	4071.5
⅛	0.9940	14	153.93	38	1134.1	73	4185.3
¼	1.227	½	165.13	39	1194.5	74	4300.8
⅜	1.484	15	176.71	40	1256.6	75	4417.8
½	1.767	½	188.69	41	1320.2	76	4536.4
⅝	2.073	16	201.06	42	1385.4	77	4656.0
¾	2.405	½	213.82	43	1452.2	78	4778.3
⅞	2.761	17	226.98	44	1520.5	79	4901.6
2	3.141	½	240.52	45	1590.4	80	5026.5
¼	3.976	18	254.46	46	1661.9	81	5153.0
½	4.908	½	268.80	47	1734.9	82	5281.0
¾	5.939	19	283.52	48	1809.5	83	5410.6
3	7.068	½	298.64	49	1885.7	84	5541.7
¼	8.295	20	314.16	50	1963.5	85	5674.5
½	9.621	½	330.06	51	2042.8	86	5808.8
¾	11.044	21	346.36	52	2123.7	87	5944.6
4	12.566	½	363.05	53	2206.1	88	6082.1
½	15.904	22	380.13	54	2290.2	89	6221.1
5	19.635	½	397.60	55	2375.8	90	6361.7
½	23.758	23	415.47	56	2463.0	91	6503.8
6	28.274	½	433.73	57	2551.7	92	6647.6
½	33.183	24	452.39	58	2642.0	93	6792.9
7	38.484	½	471.43	59	2733.9	94	6939.7
½	44.178	25	490.87	60	2827.4	95	7088.2
8	50.265	26	530.93	61	2922.4	96	7238.2
½	56.745	27	572.55	62	3019.0	97	7389.8
9	63.617	28	615.75	63	3117.2	98	7542.9
½	70.882	29	660.52	64	3216.9	99	7697.7

To find the area of a circle when diameter is given, multiply the square of the diameter by 7854.

Circumference of Circles

Diameter	Circum-ference	Diameter	Circum-ference	Diameter	Circum-ference	Diameter	Circum-ference
⅛	.3927	10	31.416	30	94.248	65	204.204
¼	.7854	½	32.987	31	97.389	66	207.345
⅜	1.1781	11	34.558	32	100.531	67	210.487
½	1.5708	½	36.128	33	103.673	68	213.628
⅝	1.9635	12	37.699	34	106.814	69	216.770
¾	2.3562	½	39.270	35	109.956	70	219.911
⅞	2.7489	13	40.844	36	113.097	71	223.053
1	3.1416	½	42.412	37	116.239	72	226.195
⅛	3.5343	14	43.982	38	119.381	73	229.336
¼	3.9270	½	45.553	39	122.522	74	232.478
⅜	4.3197	15	47.124	40	125.664	75	235.619
½	4.7124	½	48.695	41	128.805	76	238.761
⅝	5.1051	16	50.265	42	131.947	77	241.903
¾	5.4978	½	51.836	43	135.088	78	245.044
⅞	5.8905	17	53.407	44	138.230	79	248.186
2	6.2832	½	54.978	45	141.372	80	251.327
¼	7.0686	18	56.549	46	144.513	81	254.469
½	7.8540	½	58.119	47	147.655	82	257.611
¾	8.6394	19	59.690	48	150.796	83	260.752
3	9.4248	½	61.261	49	153.938	84	263.894
¼	10.210	20	62.832	50	157.080	85	267.035
½	10.996	½	64.403	51	160.221	86	270.177
¾	11.781	21	65.973	52	163.363	87	273.319
4	12.566	½	67.544	53	166.504	88	276.460
½	14.137	22	69.115	54	169.646	89	279.602
5	15.708	½	70.686	55	172.788	90	282.743
½	17.279	23	72.257	56	175.929	91	285.885
6	18.850	½	73.827	57	179.071	92	289.027
½	20.420	24	75.398	58	182.212	93	292.168
7	21.991	½	76.969	59	185.354	94	295.310
½	23.562	25	78.540	60	188.496	95	298.451
8	25.133	26	81.681	61	191.637	96	301.593
½	26.704	27	84.823	62	194.779	97	304.734
9	28.274	28	87.965	63	197.920	98	307.876
½	29.845	29	91.106	64	201.062	99	311.018

To find the circumference of a circle when diameter is given, multiply the given diameter by 3.1416.

METRIC AND ENGLISH MEASURES

Measures of Length

Metric			English	
1	metre	=	39.37 3.28	inches feet
.3048	metre	=	1	foot
1	centimetre	=	.3937	inch
2.54	centimetres	=	1	inch
1	millimetre	=	.03927	inch (1/25 inch, nearly)
25.4	millimetres	=	1	inch
1	kilometre	=	1093.61	yards

Measures of Surface

1	square metre	=	10.764	square feet
.0929	square metre	=	1	square foot
1	square centimetre	=	.155	square inch
6.452	square centimetres	=	1	square inch
1	square millimetre	=	.00155	square inch
645.2	square millimetres	=	1	square inch

Measures of Volume

1	cubic metre	=	35.314	cubic feet
.02832	cubic metre	=	1	cubic foot
1	cubic decimetre	=	61.023 .0353	cubic inches cubic foot
28.32	cubic decimetres	=	1	cubic foot
16.387	cubic centimetres	=	1	cubic inch
1	cubic centimetre	=	.061	cubic inch

Measures of Capacity

1	litre = 1 cubic decimetre	=	61.023 .0353 .2202 2.202	cubic inches cubic foot gallon (Imperial) pounds of water at 62 degrees Fahrenheit
28.317	litres	=	1	cubic foot (6.25 Imperial gallons)
4.543	litres	=	1	gallon (Imperial)
3.785	litres	=	1	gallon (American)

Measures of Weight

Metric			English	
28.35	grammes	=	1	ounce avoirdupois
1	kilogramme	=	2.2046	pounds
.4536	kilogramme	=	1	pound
1 1000	metric ton kilogrammes	=	.9842 19.68	ton of 2240 pounds, or cwts. or 2204.6 pounds
1.016 1016	metric tons kilogrammes	=		1 ton of 2240 pounds

Miscellaneous

1	gramme per square millimetre	=	1.422	pounds per square inch
1	kilogramme per square millimetre	=	1422.32	pounds per square inch
1	kilogramme per square centimetre	=	14.233	pounds per square inch
1.0335	kilogramme per square centimetre 1 atmosphere	=	14.7	pounds per square inch
0.070308	kilogramme per square centimetre	=	1	pound per square inch

METRIC AND ENGLISH MEASURES

Measures of Pressure and Weight

1 lb. per square inch	=	144	pounds per square foot
		2.0355	inches of mercury at 32 degrees Fahrenheit
		2.0416	inches of mercury at 62 degrees Fahrenheit
		2.309	feet of water at 62 degrees Fahrenheit
		27.71	inches of water at 62 degrees Fahrenheit
1 Atmosphere (14.7 pounds per square inch)	=	2116.3	pounds per square foot
		33.947	feet of water at 62 degrees Fahrenheit
		30	inches of mercury at 62 degrees Fahrenheit
		29.929	inches of mercury at 32 degrees Fahrenheit
		760	millimetres of mercury at 32 degrees Fahrenheit
1 Foot of Water at 62 degrees Fahrenheit	=	.433	pounds per square inch
		62.355	pounds per square foot
1 Inch of Mercury at 62 degrees Fahrenheit	=	.491	pound or 7.86 ounces per square inch
		1.132	feet of water at 62 degrees Fahrenheit
		13.58	inches of water at 62 degrees Fahrenheit

Weight of Pure Water

At 32 degrees Fahrenheit (freezing point)	62.418 pounds per cubic foot
At 39.1 degrees Fahrenheit (maximum density)	62.425 pounds per cubic foot
At 62 degrees Fahrenheit (standard temperature)	62.355 pounds per cubic foot
At 212 degrees Fahrenheit (boiling point, under 1 atmosphere)	59.76 pounds per cubic foot
Imperial gallon = 277.274 cubic inches of water at 62 degrees Fahrenheit	= 10 pounds
American gallon = 231 cubic inches of water at 62 degrees Fahrenheit	= 8.3356 pounds

General Data

1 Calorie	=	3.968	B.t.u.
1 B.t.u.	=	0.252	Calorie
1 Pound per square inch^2	=	703.08	kilogrammes per square meter
1 Kilogramme per m^2	=	.00142	pounds per square inch
1 Calorie per m^2	=	.3687	B.t.u. per square foot
1 B.t.u. per square foot	=	2.712	calories per square meter
1 Calorie per m^2 per degree difference Centigrade	=	.2048	B.t.u. per square foot per degree difference Fahrenheit
1 B.t.u. per square foot per degree difference Fahrenheit	=	4.882	Calories per square meter per degree difference Centigrade
1 B.t.u. per pound	=	.556	Calories per kilogramme
1 Calorie per kilogramme	=	1.8	B.t.u. per pound
Water expands in bulk from 40 degrees to 212 degrees	=		One twenty-third.

A cubic inch of water evaporated under ordinary atmospheric pressure is converted into 1 cubic foot of steam (approximately).

MISCELLANEOUS TABLES

Specific Heat of Various Substances

Water	1.0000	Birch	0.4800
Air	0.2375	Oak	0.5700
Oxygen	0.2175	Plaster	0.2000
Nitrogen	0.2438	Glass	0.1937
Hydrogen	3.4090	Brickwork	0.1950
Coal	0.2777	Masonry	0.2159
Coke	0.2010	Cast Iron	0.1298
Petroleum	0.4340	Wrought Iron	0.1138
Pine	0.4670	Steel (soft)	0.1165

Weights

1 cubic inch of Cast Iron	weighs	0.260 pound
1 cubic inch of Wrought Iron	weighs	0.280 pound
1 cubic inch of Water	weighs	0.036 pound
1 U. S. Gallon	weighs	8.330 pounds
1 Imperial Gallon	weighs	10.000 pounds
1 U. S. Gallon	equals	231.000 cubic inches
1 Imperial Gallon	equals	277.274 cubic inches
1 cubic foot of Water	equals	7.480 U. S. gallons
1 pound of Steam	equals	27.222 cubic feet
1 pound of Air	equals	13.817 cubic feet

MEASURE OF SOLIDITY

1728 cubic inches = 1 cubic foot
27 cubic feet = 1 cubic yard

LIQUID MEASURE

4 gills make 1 pint
2 pints make 1 quart
4 quarts make 1 gallon
31½ gallons make 1 barrel

Boiling Points of Various Fluids

	Degrees		Degrees
Water, Atmospheric Pressure	212	Refined Petroleum	316
Alcohol	173	Turpentine	315
Sulphuric Acid	240	Sulphur	570
		Linseed Oil	597

Melting Points of Different Metals

	Degrees		Degrees
Aluminum	1400	Iron (cast)	2550
Antimony	810	Iron (wrought)	2912
Bismuth	476	Lead	608
Brass	1900	Platinum	3080
Bronze	1692	Silver (pure)	1873
Copper	1996	Steel	2500
Glass	2377	Tin	446
Gold (pure)	2590	Zinc	680

NOTE.—Above information is quoted from standard authorities. Not guaranteed.

Energy and Work Equivalents

1 Boiler Horsepower	Evaporation of 34.5 pounds of water per hour from and at 212 degrees Fahrenheit 33479 B.t.u. per hour 139 square feet Steam Radiation
1 Mech. Horsepower	42.4 B.t u. per minute 33000 foot pounds per minute
1 B.t.u.	778 foot pounds
1 ton of refrigeration	200 B.t.u. per minute
Latent heat of ice	144 B.t.u. per pound
1 Watt hour	2655.4 foot pounds = 3.412 B.t.u.
1 Kilowatt (1000 watts)	1.3405 Horsepower = 59.6 B.t.u. per minute
1 Horsepower	0.746 Kilowatts

CLASSIFIED TELEGRAPH CODE

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*For Number, Date, and Supplementary Codes see pages G 4 and 5.

Quotations and Correspondence *

	Code Word
Answer by first mail	Abacist
Answering your wire of date the carload rate per cwt. and minimum weight on	Abactor
Answering your wire of date less than carload rate per cwt on	Abaiser
At what price and how soon can you furnish?	Albanga
Change my route to read as follows	Abature
Do not understand the meaning of	Abderite
Factory shipment with regular freight allowance	Abelmosk
Have received no reply to our letter of	Abetment
Have received no reply to our telegram of	Abidance
Have written	Abietic
Immediate specifications, three months' delivery limit	Abjugate
Inclosure mentioned in your letter of.....not received, mail same at once	Ableness
In market for	Abluvion
Mail as promptly as possible	Abnodate
Must have information immediately	Abradant
Quote best price on	Abreption
Quote best price on........square feet of standard (38-inch) height of......Radiators	Abscissa
See our letter of........giving full particulars	Abyssal
We are mailing today	Acadian
We quote you for immediate acceptance	Acanthus
Will be here until	Acceder
Will be in	Acclimat
Will wire you tomorrow morning	Accolade
Wire credit approval	Accrescent
Wire at once less than carload freight rate on	Accordion
Wire carload freight rate on	Accretion
Wire reply quickly	Accumbent
2½ per cent	Acerose
5 per cent	Acicular
7½ per cent	Acinous
10 per cent	Acoustic

Orders and Shipments *

	Code Word
After receipt of order	Baboonery
Answering your inquiry, we could promise shipment within........after receipt of order	Bacciform
Answering your wire, no record of orders referred to	Bacteria
Answering your wire, route material covered by	Bacillar
Can ship complete your No...... immediately except........ Shall we make such shipment?	Backlog

* See also Supplement, page 5.

Orders and Shipments

Continued

	Code Word
Can you ship immediately?	Baconian
Can you ship immediately? If not how soon can you promise shipment?	Baculite
Cannot ship immediately but can ship (date)	Bailable
Cannot ship immediately; may we substitute?	Bakehouse
Change our order (No. or date) to read	Balanite
Correction notices	Baldness
Could ship immediately	Balkingly
Disregard routing instructions our letter and substitute	Balladry
Do not find any order from you (No. or date)	Ballistic
Do not hold for other orders, but rush quickly	Balmoral
Duplicate our order (No. or date)	Baluster
Enter order as per our inquiry	Banality
Enter order at your quotation of	Bandoleer
Expect to make shipment	Banisher
Forward as carload shipment if actual weight of material exceeds	Banquet
Forward by express	Barbate
Forward by parcel post	Barbe
Forward as less carload shipment	Barbaric
Have you shipped our order No.....?	Barbecue
Hold for instruction order (No. or date)	Barbicel
How should we handle?	Bareness
If not in stock wire	Bargainer
Include in car now assembling at	Baritone
Make proposed shipment order No....... without waiting for	Barnacle
Must have immediate shipment Order No.	Barometz
Necessary parts to increase	Baroscope
Order No..... has been preferred for shipment	Barricade
Order No...... has not yet been shipped	Barrowist
Order No...... is ready for shipment. We have no car going for.... days. Shall we forward as small lot? If so wire shipping instructions	Bartizan
Omit...... from our order (No. or date)	Basaltic
Plant has not sufficient weight for minimum car—lack...... pounds—wire additional specifications for minimum car at..... Plant	Bashfully
Referring to your correction notice	Basketry
Referring to our order (No. or date)	Basswood
Referring to your order (No. or date)	Basylous
See our correction notice	Batterer
Send as small lot, unless car going at once	Bavarian
Send us bill of lading covering our order (No.......)	Bayberry
Shall we recall?	Beaconage
Ship by best route	Beadwork
Ship by boat	Beamingly
Ship by express	Beastlike

Orders and Shipments

Continued

	Code Word
Ship express C. O. D. amount to collect $	Beautify
Ship by express, prepaid	Beddable
Ship by freight	Bedspread
Ship by freight prepaid	Befuddle
Ship by Parcel Post	Befriend
Ship by same route as our order (No. or date)	Begabble
Ship immediately	Begonia
Ship immediately our order No.	Belonite
Ship in first car to	Bendable
Ship what you can at once	Benedict
Ship with draft and bill of lading attached	Bengalese
Shipping instructions for order (No. or date) are	Benzoate
To be same pattern as our order No.	Bergamot
Trace at once and advise date of delivery to consignee of material covered by our orders	Berretta
We are forwarding you today our confirming order No.	Beverage
We cannot comply with your instructions	Bewilder
When and by what route did you ship our order	Bibitory
When can you make shipment?	Bicaudal
When and from where can you ship?	Bicameral
When will order (No. or date) be shipped?	Biferous
When will you have car in which you will include Order No.	Bilander
When will you ship car containing our order?	Billiards
When will you ship car containing requisition No.	Billings
Will send shipping instructions by mail	Bimanous
Wire at once routing our material covered by	Bindweed
Wire.........Branch prospects car including Requisitions	Biologist
You may substitute on our order (No. or date)	Bitterly
Your order (No. or date) does not specify	Bivalent
Your order (No. or date) was shipped	Bivouac

Number Code

0—C
1—E
2—G
3—L
4—O
5—P
6—S
7—T
8—U
9—W

As you will observe the new number code simply provides for the use of a letter in place of a digit. These letters are to be used in the place of numbers in coding all order numbers, requisition numbers, car numbers, etc. In order that all code words shall be five letters in length if possible, you will use C's representing naughts (0) in front of numbers of less than five digits, so as to make a code word of five letters.

Example of coded order number:

37642—Ltsog
581—Ccpue

Date Code

In sending dates you will use first three letters only, of the month, together with two letters from the number code, to express the day of the month. The reason for using the two letters in every case is so as to have a five letter code word, which is a check on the transmission of code.

Example of coded dates:

May 12—Mayeg
Sep. 1—Sepce

Supplementary Code

	Code Word
Add to order	Addto
Add to requisition	Addtr
Did you ship as promised?	Dysap
Disregard our letter	Dolet
Disregard our telegram	Dotel
Have no record your order	Hnryo
Have no record your requisition	Hnryr
How will you handle? Reply by letter	Hwyhl
How will you handle? Reply by wire	Hwyhw
Include in first car	Incfc
Must have immediate shipment. Wire (advising when you will ship)	Mhisw
Order confirms	Ordcf
Prefer (and) ship immediately. Advise (us date you will ship by) letter	Psial
Prefer (and) ship immediately. Advise (us date you will ship by) wire	Psiaw
Referring to your letter	Refyl
Referring to our letter	Refol
Referring to your telegram	Refyt
Referring to our telegram	Refot
Referring to 'phone conversation	Refpc
Requisition confirms	Reqcf
Release and ship immediately. Wire (advising when you will ship)	Rasiw
Release and ship immediately. Reply by letter advising when you will ship	Rasil
Ship via Q. D. Forwarding	Svqdf
Ship via Universal Carloading and Distributing Co.	Svucl
Unless car moves tomorrow (24 hours) wire reply	Ucmtw
Unless shipping today wire reply	Ustdw
Unless shipping tomorrow wire reply	Ustmw
Wire car number and routing	Wcnar
When can you ship? Wire reply	Wcysw
Wire (us) best possible shipping date	Wbpsd

Manufacturing Plants

Plants	Code Word	Plants	Code Word
Bayonne	Cetacean	Litchfield	Chevroned
Birmingham	Chaffinch	Malleable, Buffalo	Chevey
Bond, Buffalo	Chaldrich	Michigan, Detroit	Chivalric
Brantford, Ont.	Chambered	Minnesota, St. Paul	Choose
Holland, Bremen, Ind.	Chapelet	Pierce, Buffalo	Chondrite
Illinois, Springfield	Chase	Terminal Jacket, Buffalo	Choul
Kansas City	Chatoyant		

Transportation Lines

	Code Word
Akron, Canton & Youngstown Ry	Dactyl
Alabama Great Southern R. R.	Dabbling
American-Hawaiian Steamship Co	Dagger
Alabama, Tennessee & Northern R. R	Daffodil
Alabama & Vicksburg Ry.	Daedalous
Ann Arbor R. R.	Dairyman
Atchison, Topeka & Santa Fe Ry	Damascene
Atlanta & West Point R. R	Damourite
Atlanta, Birmingham & Coast R. R	Damewort
Atlantic & Yadkin Ry	Damian
Atlantic Coast Line R. R	Danburite
Baltimore & Ohio R. R	Dandruff
Baltimore & Ohio Chicago Terminal R. R	Danebrog
Bangor & Aroostook R. R	Danseuse
Belt Ry. of Chicago	Daphnad
Bessemer & Lake Erie R. R	Dapple
Birmingham Belt R. R	Darapti
Boston & Albany R. R	Darbyite
Boston & Maine R. R	Dartingly
Boyne City, Gaylord & Alpena R. R	Darkening
Buffalo & Susquehanna R. R	Datiscin
Buffalo, Rochester & Pittsburgh Ry	Dashingly
Canadian National Ry	Daturine
Canadian Pacific Ry	Dauntless
Central of Georgia Ry	Deanship
Central R. R. of New Jersey	Debarment
Central Vermont Ry	Debellate
Charleston & Western Carolina Ry	Debonair
Chesapeake & Ohio Ry	Debutant
Chicago & Alton R. R	Defilade
Chicago & Eastern Illinois Ry	Deflorate
Chicago & Illinois Midland Ry	Defluous
Chicago & North Western Ry	Defrayer
Chicago, Aurora & Elgin R. R	Decalet
Chicago, Burlington & Quincy R. R	Decanter
Chicago Great Western R. R	Dicennial
Chicago, Indianapolis & Louisville Ry	Decipium
Chicago Junction Ry	Decipolar

Transportation Lines
Continued

	Code Word
Chicago, Milwaukee, St. Paul & Pacific R. R.	Decorous
Chicago, North Shore & Milwaukee R. R.	Decostate
Chicago River & Indiana R. R.	Decrepit
Chicago, Rock Island & Pacific Ry.	Deerhound
Chicago, St. Paul, Minneapolis & Omaha Ry.	Deficate
Chicago, South Shore & South Bend R. R.	Definer
Chicago, Springfield & St. Louis Ry.	Definite
Cincinnati, New Orleans & Texas Pacific Ry.	Delphian
Cincinnati Northern R. R.	Deltidium
Cleveland & Buffalo Transit Co.	Demarcate
Cleveland, Cincinnati, Chicago & St. Louis Ry.	Demagogic
Clinchfield R. R.	Demantoid
Clyde Steamer Co.	Demeanor
Colorado & Southern Ry.	Demiurgic
Columbia, Newberry & Laurens R. R.	Demivolt
Copper Range R. R.	Dempster
Danville & Western Ry.	Demulcent
Delaware & Hudson Co.	Demurity
Delaware, Lackawanna & Western R. R.	Demulsion
Denver & Rio Grande Western R. R.	Denarius
Denver & Salt Lake Ry.	Denizen
Detroit & Cleveland Navigation Co.	Deniable
Detroit & Mackinac R. R.	Denotable
Detroit & Toledo Shore Line R. R.	Denseness
Detroit Terminal R. R.	Densimeter
Detroit, Toledo & Ironton R. R.	Dendrite
Detroit United Ry.	Dentagra
Duluth & Iron Range R. R.	Dentiform
Duluth, Missabe & Northern Ry.	Dentated
Duluth, South Shore & Atlantic Ry.	Dentinal
East Tennessee & Western North Carolina R. R.	Dentalgia
Elgin, Joliet & Eastern Ry.	Depascent
Erie R. R.	Depicture
Florida East Coast Ry.	Depilatory
Fort Dodge, Des Moines & Southern R. R.	Deplorable
Fort Smith & Western Ry.	Deplume
Ft. Worth & Denver City Ry.	Depletory
Galveston, Harrisburg & San Antonio Ry.	Deplorer
Georgia R. R.	Deponent
Georgia & Florida R. R.	Depolish
Goodrich Transit Co.	Depopulate
Grand Trunk Ry.	Deputator
Great Lakes Transit Corp.	Depressor
Great Northern Ry.	Deputize
Green Bay & Western R. R.	Derivate
Gulf Coast Lines	Dermology
Gulf, Colorado & Santa Fe R. R.	Dermatine
Gulf, Mobile & Northern R. R.	Dernier
Hocking Valley Ry.	Dermestes

Transportation Lines

Continued

	Code Word
Houston & Texas Central R. R.	Derringer
Illinois Central R. R.	Derogate
Illinois Northern Ry	Derotrema
Illinois Terminal R. R. System	Descent
Indiana Harbor Belt R. R.	Describer
International-Great Northern R. R.	Desertful
Kansas City Southern Ry	Desireful
Kansas, Oklahoma & Gulf Ry	Desition
Kewaunee, Green Bay & Western R. R.	Detector
Lake Erie & Western R. R.	Developer
Lehigh & Hudson River Ry	Dewiness
Lehigh & New England R. R.	Deweylite
Lehigh Valley R. R.	Dewberry
Long Island R. R.	Dexterous
Louisiana & Arkansas Ry	Dexter
Louisiana Ry. & Nav. Co.	Diabase
Louisville & Nashville R. R.	Dextronal
Luckenbach Steamship Co	Diabantite
Macon, Dublin & Savannah R. R	Diabolo
Maine Central R. R.	Diaconate
Mallory Steamship Co.	Diagraph
Maryland & Pennsylvania R. R.	Diahydric
Merchants & Miners Transportation Co.	Dialectic
Michigan Central R. R.	Dialogist
Midland Valley R. R.	Dialysis
Mineral Range R. R.	Diastase
Minneapolis & St. Louis R. R.	Diamonded
Minneapolis, Northfield & Southern Ry	Diamondize
Minneapolis, St. Paul & Sault Ste. Marie Ry	Diametral
Minnesota-Atlantic Transit Co	Diamicton
Minnesota Transfer Ry	Diamide
Mississippi Central R. R	Dianthine
Mississippi Warrior Barge Service	Diamylene
Missouri-Kansas-Texas R. R.	Diandrous
Missouri Pacific R. R.	Diaphane
Mobile & Ohio R. R.	Diaphonic
Montpelier & Wells River R. R	Diapason
Morgan Line	Dibstone
Nashville, Chattanooga & St. Louis Ry	Didymium
New England Steamship Co	Diegesis
New Orleans & Northeastern R. R.	Dietarian
New Orleans-Great Northern R. R.	Dielectric
New York Central Lines	Dietitian
New York, Chicago & St. Louis R. R.	Diffident
New York, New Haven & Hartford R. R.	Digitalis
New York, Ontario & Western Ry	Dignation
Norfolk & Western Ry	Dignified
Norfolk Southern R. R.	Digraph
Northern Ohio Ry	Digress

Transportation Lines

Continued

	Code Word
Northern Pacific Ry	Digonous
Ocean Steamship Co. of Savannah	Digression
Old Dominion Steamship Co.	Dihedral
Panama Pacific Line	Dihelium
Pennsylvania R. R.	Dimensive
Pere Marquette Ry	Dimetric
Piedmont & Northern Ry	Dinoceras
Pittsburgh & Lake Erie R. R.	Dinosaur
Pittsburg & West Virginia Ry	Dinocrates
Pittsburg, Shawmut & Northern R. R	Dinomic
Quincy, Omaha & Kansas City R. R.	Diocesan
Raritan River R. R	Diodorus
Reading Co.	Diodon
Richmond, Fredericksburg & Potomac R. R.	Diogenes
Roscoe, Snyder & Pacific Ry	Diolefine
Rutland R. R.	Dioptase
Sacramento Northern Ry	Dioptron
St. Louis-San Francisco Ry	Diplomat
St. Louis Southwestern Ry	Diplanar
Seaboard Air Line Ry	Directive
South Brooklyn Ry	Dirempt
Southern Pacific Lines	Dirigible
Southern Ry	Disabuse
Spokane, Portland & Seattle Ry	Disagio
Staten Island Rapid Transit Ry	Disagreer
Tennessee Central Ry	Disaffect
Terminal R. R. Ass'n of St. Louis	Disaffirm
Texas & New Orleans R. R.	Disburser
Texas & Pacific Ry	Discerner
Toledo, Peoria & Western R. R.	Disciform
Toledo, St. Louis & Western R. R.	Discoidal
Toronto, Hamilton & Buffalo Ry	Discusser
Union Pacific System	Disponer
Vicksburg, Shreveport & Pacific Ry	Diurnally
Virginian Ry	Diuretic
Wabash Ry	Divertive
Washington, Baltimore & Annapolis Electric R. R.	Dividend
Waterloo, Cedar Falls & Northern Ry	Dividual
Western Maryland Ry	Dodecane
Western Pacific R. R.	Dockyard
Western Railway of Alabama	Docimassy
West Shore R. R.	Dochmius
Wheeling & Lake Etie Ry	Doggerman
White Star Line	Dogmatic
Williamsport & North Branch Ry	Dogrose
Winston Salem Southbound Ry	Dokamok
Yadkin R. R	Dolabra
Yazoo & Mississippi Valley R. R.	Dolomite

Inches

Inches	Code Word	Inches	Code Word
⅛	Ebullient	4¾	Emblazon
¼	Eburnine	5	Embolite
⅜	Ecboline	5¼	Embosser
½	Echinate	5½	Emersion
⅝	Echoless	5¾	Emigrate
¾	Ecliptic	6	Eminence
⅞	Ecstatic	6¼	Emissary
1	Edelweiss	6½	Emphasis
1⅛	Edifying	6¾	Empirical
1¼	Educative	7	Emptiness
1⅜	Efflation	7¼	Emulation
1½	Effusion	7½	Emulsify
1⅝	Eglantine	7¾	Enactment
1¾	Egyptian	8	Enchanted
1⅞	Ejaculate	8¼	Encompass
2	Elatedly	8½	Encumber
2¼	Elective	8¾	Endearing
2½	Elegance	9	Endlessly
2¾	Elephant	9¼	Enduring
3	Elevated	9½	Energetic
3¼	Eligible	9¾	Enfilade
3½	Elongate	10	Enlighten
3¾	Eloquent	10½	Entangle
4	Elusively	11	Environs
4¼	Embarrass	11½	Epicurean
4½	Embellish	12	Equipoise

Time

	Code Word		Code Word
1 day	Fabricate	2 months	Farinose
2 days	Fabulous	3 months	Farmable
3 days	Factioner	4 months	Fashioner
4 days	Factorial	5 months	Fauvette
5 days	Falciform	6 months	Fovonion
6 days	Falconer	7 months	Favosites
10 days	Falsetto	8 months	Feathered
1 week	Fanciful	9 months	Federate
2 weeks	Fangless	10 months	Feldspar
3 weeks	Fantistic	11 months	Felicity
1 month	Farcilite	1 year	Fenceless

AMERICAN CORTO RADIATION

	Code Word
38 inch, 3 Tube*	Gabarre
38 inch, 4 Tube	Gabata
38 inch, 5 Tube*	Gabbard
38 inch, 6 Tube	Gabble

AMERICAN CORTO RADIATION

Continued

	Code Word
32 inch, 3 Tube*	Gabbro
32 inch, 4 Tube	Gabilan
32 inch, 5 Tube*	Gablet
32 inch, 6 Tube	Gadder
26 inch, 3 Tube*	Gaduin
26 inch, 4 Tube	Gaffer
26 inch, 5 Tube*	Galbanum
26 inch, 6 Tube	Galena
23 inch, 3 Tube	Galiage
23 inch, 4 Tube	Galiot
23 inch, 5 Tube	Gallant
23 inch, 6 Tube	Gallet
20 inch, 3 Tube	Gallize
20 inch, 4 Tube	Gallopin
20 inch, 5 Tube	Gallsome
20 inch, 6 Tube	Galonier
20 inch, 7 Tube ACW	Galpon
17 inch, 7 Tube ACW	Galvanic
14 inch, 7 Tube ACW	Gambist

*To designate American Corto Hospital Radiation use code word shown above followed by the word "Hospital."

AMERICAN FANTOM RADIATION

	Code Word
23 inch, 1 Tube	Gedrite
23 inch, 2 Tube	Geison
23 inch, 3 Tube	Gelation
23 inch, 4 Tube	Geldable
23 inch, 5 Tube	Gelosine
20 inch, 1 Tube	Gemmary
20 inch, 2 Tube	Genappe
20 inch, 3 Tube	Gendarme
20 inch, 4 Tube	Geneal
20 inch, 5 Tube	Generant
17 inch, 1 Tube	Generic
17 inch, 2 Tube	Genetous
17 inch, 3 Tube	Genital
17 inch, 4 Tube	Genteel
17 inch, 5 Tube	Gentian

BOILER CODE—Ideal Arcoflash Boilers

	Code Word		Code Word
S-18	Habit	W-18	Handle
S-20	Hacker	W-20	Happy
S-22	Hairy	W-22	Harbor
S-24	Handy	W-24	Harden

Ideal Arco Round Boiler

Steam		*Water*	
	Code Word		Code Word
S-1704	Kyabe	W-1704	Kymam
S-1904	Kyaco	W-1904	Kymol
S-2004	Kyads	W-2004	Kymuk
S-2204	Kybac	W-2204	Kynan
S-2504	Kybob	W-2504	Kynom
S-2804	Kybuv	W-2804	Kynug
S-1705	Kycoc	W-1705	Kyoci
S-1905	Kycut	W-1905	Kyodu
S-2005	Kydaf	W-2005	Kypap
S-2205	Kydod	W-2205	Kypon
S-2505	Kydur	W-2505	Kypuf
S-2805	Kyfag	W-2805	Kyrar
S-1706	Kyfup	W-1706	Kyrud
S-1906	Kygak	W-1906	Kysat
S-2006	Kygog	W-2006	Kysor
S-2206	Kygun	W-2206	Kysuc
S-2506	Kylal	W-2506	Kytav
S-2806	Kylok	W-2806	Kytot

Ideal Arcola Heaters and Arcola Hot Water Supply Boilers

Boiler No.	Heaters Code Word	Hot Water Supply Boilers Code Word
4H	Labent	Laden
5H	Labiate	Lumber
6H	Labile	Lucky
7H	Laborite	Lundo
8H	Labras	Lunar
9H	Labrient	Lucid

Ideal Smokeless Boilers

	Code Word		Code Word
S-2308-S	Lovable	W-2308-S	Loxia
S-2309-S	Lowan	W-2309-S	Loyal
S-2310-S	Lowell	W-2310-S	Lozenge
S-2311-S	Lowland	W-2311-S	Lubber
S-2312-S	Lowry	W-2312-S	Lubric

BOILER CODE—Ideal Smokeless Boilers

Continued

Steam	Code Word	*Water*	Code Word
S-2907-S	Lammas	W-2907-S	Lampful
S-2908-S	Lammer	W-2908-S	Lampic
S-2909-S	Lammermoor	W-2909-S	Lamping
S-2910-S	Lammert	W-2910-S	Lampion
S-2911-S	Lammie	W-2911-S	Lampist
S-3608-S	Lamming	W-3608-S	Lampless
S-3609-S	Lamnectomy	W-3609-S	Lamplight
S-3610-S	Lamnidae	W-3610-S	Lampong
S-3611-S	Lamnoid	W-3611-S	Lampoon
S-3612-S	Lamoille	W-3612-S	Lampooner
S-3613-S	Lamongan	W-3613-S	Lampoonry
S-3614-S	Lamoni	W-3614-S	Lamprey
S-3615-S	Lamotte	W-3615-S	Lampric
S-4807-S	Lamoure	W-4807-S	Lamproid
S-4808-S	Lamps	W-4808-S	Lamprophane
S-4809-S	Lampad	W-4809-S	Lamprops
S-4810-S	Lampadary	W-4810-S	Lamprotype
S-4811-S	Lampadist	W-4811-S	Lampacen
S-4812-S	Lampadite	W-4812-S	Lampsacus
S-4813-S	Lampadrome	W-4813-S	Lampsana
S-4814-S	Lampas	W-4814-S	Lampsilus
S-7909-S	Lampate	W-7909-S	Lampt
S-7910-S	Lampblack	W-7910-S	Lampwick
S-7911-S	Lampedusa	W-7911-S	Lamuel
S-7912-S	Lamper	W-7912-S	Lamus
S-7913-S	Lampreel	W-7913-S	Lanat
S-7914-S	Lamperina	W-7914-S	Lanahan
S-7915-S	Lampern	W-7915-S	Lanark
S-7916-S	Lampet	W-7916-S	Lanarkite
S-7917-S	Lampeter	W-7917-S	Lanarkshire

Ideal Water Tube Boilers

Steam	Code Word	*Water*	Code Word
S-2305	Letca	W-2305	Lidap
S-2306	Letdu	W-2306	Lidba
S-2307	Leteb	W-2307	Lidci
S-2308	Letfa	W-2308	Liedo
S-2309	Letgi	W-2309	Liefu
S-2310	Letub	W-2310	Lieke
S-2905	Levho	W-2905	Liega
S-2906	Levic	W-2906	Liehi

BOILER CODE—Ideal Water Tube Boilers

Continued

Steam	Code Word	*Water*	Code Word
S-2907	Levju	W-2907	Lifjo
S-2908	Levka	W-2908	Lifku
S-2909	Levli	W-2909	Lifla
S-2910	Lewmo	W-2910	Lifmi
S-3606	Lewpa	W-3606	Ligpu
S-3607	Lewri	W-3607	Ligra
S-3608	Lexso	W-3708	Ligsi
S-3609	Lextu	W-3609	Lijto
S-3610	Lexuf	W-3610	Ligus
S-3611	Lexva	W-3611	Lijot
S-3612	Lexwi	W-3612	Lijwa
S-3613	Lexyg	W-3613	Lijyv
S-3614	Lezag	W-3614	Lijzi
S-3615	Lezbo	W-3615	Lilav
S-4807	Lezda	W-4807	Lilcu
S-4808	Lezek	W-4808	Lilda
S-4809	Lezfi	W-4809	Lilex
S-4810	Liago	W-4810	Lilfi
S-4811	Liahu	W-4811	Limgo
S-4812	Liaja	W-4812	Limhu
S-4813	Liaki	W-4813	Limiz
S-4814	Liblo	W-4814	Limja
S-7909	Libol	W-7909	Linmu
S-7910	Libpi	W-7910	Linoy
S-7911	Licro	W-7911	Linpa
S-7912	Licsu	W-7912	Linri
S-7913	Licta	W-7913	Liobo
S-7914	Licum	W-7914	Liotu
S-7915	Licvi	W-7915	Lioda
S-7916	Lidwo	W-7916	Liofi
S-7917	Lidyu	W-7917	Liogs

Ideal Hot Water Supply Boilers

Number	Code Word
01	Nainsook
02	Nameable
03	Nankeen
04	Napiform
05	Narcissus
06	Narrot
07	Nativity
08	Naturalite
09	Naughty

BOILER CODE—Ideal Oil Burning Boilers

Steam	Code Word	*Water*	Code Word
S-0623	Oarlock	W-0623	Octagon
S-0723	Oatcake	W-0723	Octopoda
S-0823	Oatmeal	W-0823	Odograph
S-0923	Obdurate	W-0923	Odometer
S-1023	Obedient	W-1023	Odontoid
S-1123	Obelisk	W-1123	Offering
S-1223	Obituary	W-1223	Offertory
S-1323	Obligate	W-1323	Official
S-1423	Oblique	W-1423	Oleander
S-0729	Oblivion	W-0729	Oleaster
S-0829	Obovate	W-0829	Olefiant
S-0929	Obscure	W-0929	Oligarch
S-1029	Observe	W-1029	Omniform
S-1129	Obsidian	W-1129	Ondoyant
S-1229	Obstruct	W-1229	Onomancy
S-1329	Obturate	W-1329	Onomastic
S-1429	Obverse	W-1429	Ontology
S-0836	Obviate	W-0836	Opalesce
S-0936	Obvolute	W-0936	Openwork
S-1036	Occasion	W-1036	Operatic
S-1136	Occident	W-1136	Operator
S-1236	Occulted	W-1236	Operetta
S-1336	Occultly	W-1336	Opponent
S-1436	Occupant	W-1436	Opportune
S-1536	Occupier	W-1536	Opposite

Ideal 48 and 79 Water Tube Boiler for Oil-Burning

Note: In telegraphing for Ideal 48″ and 79″ Water Tube Boilers for oil burning, you will use the regular Ideal Water Tube Boiler code word, which designates the size and kind of boiler wanted and in addition use the word "Oilbr." For instance, if you were wiring regarding a number S-4809-O Oil burning boiler, you would use the two code words Lezfi Oilbr. In the few cases where the oil burning boiler is of a longer assemblage than provided for by the coal burning words, you will be unable to use code.

Ideal Boiler Parts

List of Sections—All Types

	Code Word
Back Section	Pagenatry
Back Section, Open	Paginal
Center Air Tube Section	Pagoda
Center Connecting Section	Paguma
Center Leg Section	Pahi
Center Section	Paien
Closed Bridgewall Center Section	Palace
Closed Center Section	Palatial
Closed Connecting Section	Paleness
Closed Diving Flue Section	Palette
Closed Rear Center Section	Palisade

Ideal Boiler Parts

Continued

	Code Word
Double Section	Panicled
Firepot Section	Pantaloon
First Section Over Firepot	Panurgic
Five Flue Center Section	Panyard
Four Flue Center Section	Papagay
Front Center Section	Paparchy
Front Flue Section	Papescent
Front Flue Connecting Closed Section	Papillar
Front Flue Connecting Open Section	Paque
Front Section	Parabola
Grate Center Section	Parachute
Grate Connecting Section	Paraclose
Grate Front Flue Section	Parade
Grate Front Flue Connecting Section	Paradise
Half Open Center Section	Paragram
Half Open Connecting Section	Parapet
Half Open Front Flue Section	Parasang
Holland "A" Section	Parasite
Holland "B" Section	Parasol
Intermediate Section for Premier	Paravant
Left End Section	Parboil
Leg Section	Parcase
Open Bridgewall Connecting Section	Parcel
Open Bridgewall Center Section	Parcener
Open Center Section	Parchment
Open Connecting Section	Parietal
Open Diving Flue Section	Parish
Open Rear Center Section	Paritor
Open Rear Connecting Section	Parks
Rear Center Section	Parrakeet
Rear Center Air Tube	Parrot
Rear Connecting Section	Partridge
Right End Section	Parture
Second Section Over Firepot	Passport
Single Section	Pasturage
Six Inch Rear Section	Pasty
Space Section	Patache
Steam Dome	Patella
Third Section Over Firepot	Patrician
Three Hole Section	Patriet
Two Hole Section	Patrol
Water Dome Section	Patronage
No. 1 Section	Patten
No. 2 Section	Patulous

List of Grate Bars

	Code Word
One Set Grate Bars Only	Perception
One Set Grate Bars Complete with Connecting Bars and Arms	Perchance

BOILER CODE—Ideal Redflash Boiler, for All Fuels

Steam	Code Word	*Water*	Code Word
1-S-4	Rfhaf	1-W-4	Rfhlu
1-S-5	Rfhag	1-W-5	Rfhma
1-S-6	Rfhal	1-W-6	Rfhmi
1-S-7	Rfhbe	1-W-7	Rfhmy
1-S-8	Rfhbo	1-W-8	Rfhno
1-S-9	Rfhbu	1-W-9	Rfhod
2-S-5	Rfhce	2-W-5	Rfhoh
2-S-6	Rfhco	2-W-6	Rfhoj
2-S-7	Rfhcu	2-W-7	Rfhok
2-S-8	Rfhda	2-W-8	Rfhon
2-S-9	Rfhdi	2-W-9	Rfhor
2-S-10	Rfhed	2-W-10	Rfhot
2-S-11	Rfheh	2-W-11	Rfhov
3-S-6	Rfhek	3-W-6	Rfhoz
3-S-7	Rfhen	3-W-7	Rfhpa
3-S-8	Rfher	3-W-8	Rfhpy
3-S-9	Rfhet	3-W-9	Rfhra
3-S-10	Rfhex	3-W-10	Rfhri
3-S-11	Rfhfe	3-W-11	Rfhsa
3-S-12	Rfhfo	3-W-12	Rfhsi
3-S-13	Rfhfu	3-W-13	Rfhsy
4-S-7	Rfhge	4-W-7	Rfhta
4-S-8	Rfhgo	4-W-8	Rfhth
4-S-9	Rfhha	4-W-9	Rfhti
4-S-10	Rfhhi	4-W-10	Rfhty
4-S-11	Rfhib	4-W-11	Rfhvo
4-S-12	Rfhic	4-W-12	Rfhwa
4-S-13	Rfhif	4-W-13	Rfhwi
5-S-8	Rfhig	5-W-8	Rfhws
5-S-9	Rfhil	5-W-9	Rfhwy
5-S-10	Rfhim	5-W-10	Rfhxt
5-S-11	Rfhip	5-W-11	Efhxu
5-S-12	Rfhis	5-W-12	Rfhya
5-S-13	Rfhji	5-W-13	Rfhyi
5-S-14	Rfhka	5-W-14	Rfhys
5-S-15	Rfhki	5-W-15	Rfhzt

Ideal Redflash Boiler, Special Smokeless Type

Steam	Code Word	*Water*	Code Word
2-S-8-S	Rfsfa	2-W-8-S	Rfsgi
2-S-9-S	Rfsga	2-W-9-S	Rfsli
2-S-10-S	Rfsla	2-W-10-S	Rfsmi

BOILER CODE—Ideal Redflash Boiler, Special Smokeless Type

Continued

Steam	Code Word	*Water*	Code Word
2-S-11-S	Rfseb	2-W-11-S	Rfspi
2-S-12-S	Rfsob	2-W-12-S	Rfssi
2-S-13-S	Rfsub	2-W-13-S	Rfsij
3-S-8-S	Rfsec	3-W-8-S	Rfsak
3-S-9-S	Rfsoc	3-W-9-S	Rfsik
3-S-10-S	Rfsuc	3-W-10-S	Rfsel
3-S-11-S	Rfsad	3-W-11-S	Rfsol
3-S-12-S	Rfsid	3-W-12-S	Rfsul
3-S-13-S	Rfsde	3-W-13-S	Rfsam
3-S-14-S	Rfshe	3-W-14-S	Rfsim
4-S-9-S	Rfske	4-W-9-S	Rfsym
4-S-10-S	Rfsne	4-W-10-S	Rfson
4-S-11-S	Rfsre	4-W-11-S	Rfsdo
4-S-12-S	Rfste	4-W-12-S	Rfsho
4-S-13-S	Rfsxe	4-W-13-S	Rfsjo
4-S-14-S	Rfsef	4-W-14-S	Rfsko
5-S-9-S	Rfsof	5-W-9-S	Rfsno
5-S-10-S	Rfsuf	5-W-10-S	Rfsro
5-S-11-S	Rfseg	5-W-11-S	Rfsto
5-S-12-S	Rfsog	5-W-12-S	Rfsvo
5-S-13-S	Rfsah	5-W-13-S	Rfszo
5-S-14-S	Rfsih	5-W-14-S	Rfsap
5-S-15-S	Rfsbi	5-W-15-S	Rfsyp

NOTE: In telegraphing regarding Oil Burning Redflash Boilers you will use the regular code word which designates the size and kind of boiler wanted and in addition use the word "OILBR." For instance, if you were wiring regarding a No. 3-S-9-O Oil Burning Boiler you would use the two code words RFHET OILBR. In the few cases where the Oil Burning Boiler is of a longer assemblage than provided for by the Coal Burning words, you will be unable to use code.

PEERLESS WALL RADIATION—Style and Kind of Radiators

	Code Word
Peerless Wall, No. 5-A, Side-tapped, Steam	Senseless
Peerless Wall, No. 5-A, Side-tapped, Water	Sensorial
Peerless Wall, No. 5-A, Steam	Sentinel
Peerless Wall, No. 5-A, Water	Septangle
Peerless Wall, No. 7-B, Steam	Septuary
Peerless Wall, No. 7-B, Water	Seraphic
Peerless Wall, No. 7-A, Steam	Sergeant
Peerless Wall, No. 7-A, Water	Serotine
Peerless Wall, No. 9-B, Steam	Servable
Peerless Wall, No. 9-B, Water	Servitor
Peerless Wall, No. 9-A, Steam	Setireme
Peerless Wall, No. 9-A, Water	Setulose

VENTO AND INDIRECT RADIATION CODE

	Code Word
Perfection Pin Indirect, ex. large, bolt and flange	Scribble
Perfection Pin Indirect, standard, bolt and flange	Scrivener
Perfection Pin Indirect, extra large, with right- and left-hand threaded nipple connections	Scrutator
Perfection Pin Indirect, standard size, with right- and left-hand threaded nipple connections	Scumming
Sanitary School Pin Indirect, Steam	Severity
Sanitary School Pin Indirect, Water	Sextoness
Vento Blast Radiator, Regular, 30-inch	Shagbark
Vento Blast Radiator, Regular, 40-inch	Shagreen
Vento Blast Radiator, Regular, 50-inch	Shalloon
Vento Blast Radiator, Regular, 60-inch	Shapeless
Vento Blast Radiator, Regular, 72-inch	Sharking

Radiator Miscellanies

	Code Word
Arco Adjustable Wall Brackets, for 1 row	Shirting
Arco Adjustable Wall Brackets, for 2 rows	Shivers
Box-base with back opening	Sibilant
Box-base with bottom opening	Sicilian
Brackets, No. J	Signally
Brackets, No. K	Signetted
Brackets, No. L	Silently
Brackets, No. M	Silicide
Brackets, No. MM	Silkiness
Brackets, No. N	Silurian
Brackets, No. O	Silverize
Brackets, No. P	Similize
Bushings, 2 inches, reducing to 1½ inches	Simperer
Bushings, 2 inches, reducing to 1¼ inches	Simpleton
Bushings, 2 inches, reducing to 1 inch	Simulator
Bushings, 2 inches, reducing to ¾ inch	Sincaline
Bushings, 2 inches, reducing to ½ inch	Sincerity
Bushings, 1½ inches, reducing to 1¼ inches	Sinecure
Bushings, 1½ inches, reducing to 1 inch	Singingly
Bushings, 1½ inches, reducing to ¾ inch	Sinistral
Bushings, 1½ inches, reducing to ½ inch	Sinlessly
Concealed Brackets	Siphonic
Nipples, 2-inch, 90° right- and left-hand	Sketcher
Nipples, 1½-inch, 90° right- and left-hand	Skiffing
Nipples, 2-inch, 90° right- and left-hand with hexagon nut at center	Skilling
Nipples, 2-inch, 60° right- and left-hand	Skimming
Nipples, 1½-inch, 60° right- and left-hand	Skirmish
Nipples, 2-inch, 60° right- and left-hand (hexagon nut)	Skirting
Nipples, 2-inch, right-hand threaded	Slackness
Nipples, 2¼-inch, Slip	Slakeless
Pedestals.....inches high	Slapping

Radiator Miscellanies

Continued

	Code Word
Pedestals to make distance from floor to center of supply tapping. . . inches	Slatting
Plugs, 2-inch	Sledding
Plugs, 1½-inch	Sleepless
Plugs, ⅛-inch Brass (for air valve tapping)	Slicking
Plugs, ⅛-inch Iron (for air valve tapping)	Sliding
Wall Boxes, iron, 5x17½	Sludger
Wall Boxes, iron, 8x25	Slumber
Wall Boxes, bronze, 5x17½	Slumming
Wall Boxes, bronze, 8x25	Slushy

Radiator Miscellanies

Number of Sections

	Code Word		Code Word
2 Sections	Smallish	19 Sections	Solidary
3 Sections	Smartness	20 Sections	Solitude
4 Sections	Smelling	21 Sections	Sonnetize
5 Sections	Smilingly	22 Sections	Soothing
6 Sections	Smithery	23 Sections	Sorcerer
7 Sections	Smokable	24 Sections	Sorriness
8 Sections	Smoothing	25 Sections	Sotadean
9 Sections	Smuggler	26 Sections	Sounding
10 Sections	Snaffling	27 Sections	Soutache
11 Sections	Snapping	28 Sections	Sovereign
12 Sections	Snattock	29 Sections	Spacious
13 Sections	Sniffing	30 Sections	Spadeful
14 Sections	Snippack	31 Sections	Spadroon
15 Sections	Snowless	32 Sections	Spanking
16 Sections	Snuffers	33 Sections	Sparable
17 Sections	Snugness	34 Sections	Sparkler
18 Sections	Solacing	35 Sections	Sparsely

Names of Sections

	Code Word
Blank Leg Section, Steam	Speedless
Drip Leg Section	Spelling
Intermediate Hot-Water Leg Section	Spending
Intermediate Hot-Water Section	Spheroid
Intermediate Steam Section	Sphingid
Intermediate Steam Leg Section	Spiciness
Return Steam Leg Section	Spiculum
Return Hot-Water Leg Section	Spiderly
Supply Hot-Water Leg Section	Spikelet
Supply Steam Leg Section for double pipe	Spilikin
Supply Steam Leg Section for single pipe	Spindled
Supply Steam Leg Section with both supply and return at bottom	Spinning

Quantity

	Code Word		Code Word
200 sq. ft.	Starched	3,500 sq. ft.	Stipuled
300 sq. ft.	Startling	4,000 sq. ft.	Stockade
400 sq. ft.	Stationer	5,000 sq. ft.	Stoniness
500 sq. ft.	Statutory	6,000 sq. ft.	Storming
600 sq. ft.	Steadfast	7,000 sq. ft.	Straggler
700 sq. ft.	Stealthy	8,000 sq. ft.	Stramash
800 sq. ft.	Steerage	9,000 sq. ft.	Stratagem
900 sq. ft.	Stellular	10,000 sq. ft.	Streamer
1,000 sq. ft.	Stentorin	12,000 sq. ft.	Stressful
1,200 sq. ft.	Sternness	15,000 sq. ft.	Strigate
1,500 sq. ft.	Stibnite	20,000 sq. ft.	Striking
1,800 sq. ft.	Sticking	25,000 sq. ft.	Stripling
2,000 sq. ft.	Stilbene	30,000 sq. ft.	Stroller
2,500 sq. ft.	Stillion	40,000 sq. ft.	Stropping
3,000 sq. ft.	Stingily	50,000 sq. ft.	Stubborn

Tapping Instructions

	Code Word
¾-inch single pipe	Stunning
¾x¾-inch	Stupidly
1 in. single pipe	Sturgeon
1 x ¾-inch	Stylishly
1 x1 -inch	Styptical
1¼-inch single pipe	Subaltern
1¼x ¾-inch	Subastral
1¼x1 -inch	Subdulcid
1¼x1¼-inch	Subjacent
1½-inch single pipe	Sublimate
1½x1 -inch	Submersed
1½x1¼-inch	Subpolar
1½x1½-inch	Subserve
2 -inch single pipe	Subtilely
2 x1½-inch pipe	Suburbed
2 x ½-inch Eccentric	Suburban
2 x ¾-inch Eccentric	Subvention
1½x ½-inch Eccentric	Subversive
1½x ¾-inch Eccentric	Subway
1½ L. H.x½-inch R. H. Eccentric	Succeed
Tapped at "A"	Succinct
Tapped at "B"	Succotash
Tapped at "C"	Sudatory
Tapped at "D"	Sufficing
Tapped at "E"	Sugaring
Tapped at "F"	Sullenly
Tapped at "G"	Sulphonic
Tapped at "H"	Summarist
Tapped right hand	Sumptuous
Tapped left hand	Sunshine
Tapped for single-pipe Steam as per list	Superbly

Tapping Instructions

Continued

	Code Word
Tapped for double-pipe Steam as per list	Superfine
Tapped for top supply and bottom return on same end	Superior
Tapped for top supply and bottom return on opposite ends	Superpose
Tapped for both supply and return tappings at bottom of same end	Supinely
Tapped for ¼-inch air valves	Suppliant
All to have extra-high solid legs, so that the distance from floor to center of supply tapping shall be...... inches	Sureness
Insert blind nipple at top between loop and return leg section	Surmising
Outside thread to be left-handed	Surrender

ACCESSORIES CODE

	Code Word
Air Valves, Compression W.W., No. 520	Tallness
Air Valves, Compression Key, No. 521	Tamarisk
Air Valves, In-Airid No. 1	Tambour
Air Valves, In-Airid No. 2	Tamlin
Air Valves, Ideal Airid, Angle No. 500	Tanbark
Air Valves, Ideal Airid, Straight No. 502	Tandour
Air Valves, Ideal Vac-Airid Angle, No. 510	Tangelo
Air Valves, Ideal Vac-Airid, Straight, No. 512	Tangfish
Air Valves, Ideal Quick Vent, No. 815	Tangle
Air Valves, Ideal Quick Vent, No. 820	Tango
Air Valves, Ideal Air Line, No. 816	Tangram
Air Valves, Ideal Vento Vent, No. 817	Tangue
Air Valves, Ideal Float Quick Vent, No. 821	Tanist
Air Valves, Ideal Vac-Vent, No. 822	Tanjib
Asbestos Cement No. 402	Tankard
Asphaltum, Black (in ..... cans), No. 647	Teething
Bronze, Aluminum in one pound cans, No. 654	Telluric
Bronze, Pale Gold in one pound cans, No. 652	Tellable
Bronze, Rich Gold in one pound cans, No. 652	Temperate
Bronzing Liquid (in ....cans), No. 646	Temporal
Covers, De Luxe Radiator, No. 908	Tensive
Elbows, Union, No. 132	Termless
Floor and Ceiling Plates, No. 700	Ternate
Floor and Ceiling Plates, No. 707	Testate
Gauge, Combination Altitude and Thermometer, No. 588	Testify
Gauges, Steam, No. 577	Tetrapod
Gauges, Steam Retard, No. 579	Tetragon
Gauges, Retard Compound Pressure and Vacuum, No. 580	Tetrate
Gauges, Compound Pressure and Vacuum, No. 575	Teucer
Gauges, Altitude, No. 578	Textural
Hack Saw, Rotary, No. 739	Theoretic
Heater, Water Excelso Indirect, No. 740 Size (.....)	Theurgic
Heater, Water Excelso Direct Phaeton, No. 741, Size (.....), Material (.....)	Thicken

ACCESSORIES CODE

Continued

	Code Word
Heater, Water Excelso Direct Generator, No. 742, Size (....), Material (.....)	Thieving
Heater, Water Excelso Direct Fin Pin, No. 744 Brass, Size (....)	Thimble
Heater, Water Excelso Direct Fin Pin, No. 743 Iron, Size (.....)	Thionic
Humidifier Arco Health, No. 400	Thistle
Jewell Thermostats, No. (.....)	Throbbing
Jewell Motors, No. (.....)	Throng
Regulator, Arco Steam, No. 905	Thrower
Regulator, Arco Water, No. 800	Tickle
Regulator, Arco Jr. Water, No. 801	Tidal
Regulator, Arco Tank, No. 825	Tincture
Regulator, Arco Tank, No. 826	Tinsel
Shields, Radiator with Vapor Pan, No. 906	Titrated
Shields, Radiator without Vapor Pan, No. 906	Toadstool
Stems, Extension for Valves, Straight Type, No. 201	Toast
Stems, Extension for Valves, Offset Type, No. 202	Tobacco
Tank Brackets, No. 497	Toboggan
Tank Trimmings, Expansion, No. 494	Toilless
Tanks, Expansion Galvanized, No. 491, Style (.....)	Tollable
Tanks, Storage Black Steel, No. (.....)	Torpidity
Tanks, Storage Galvanized, No. (.....)	Tortoise
Thermometers, Ideal Red Case, Straight, No. 560	Toucanet
Thermometers, Ideal Red Case, Angle, No. 561	Touchilly
Thermometers, Ideal Dial Angle, No. 551	Toupee
Thermometers, Ideal Dial Straight, No. 550	Tourist
Valves, Arco Packless Steam Angle, No. 999	Tourney
Valves, Arco Packless Steam R.H. Corner, No. 945	Tourte
Valves, Arco Packless Steam L.H. Corner, No. 941	Touter
Valves, Arco Packless Steam R.H. True Corner, No. 953	Towage
Valves, Arco Packless Steam L.H. True Corner, No. 954	Towboat
Valves, Arco Packless Gate, No. 993	Towel
Valves, Arco Packless Globe, No. 949	Towing
Valves, Arco Packless Fractional Angle, No. 994	Townlet
Valves, Arco Packless Fractional, No. 995	Township
Valves, Arco Packless Fractional R.H. Corner, No. 942	Toxaway
Valves, Arco Packless Fractional L.H. Corner, No. 938	Toxine
Valves, Bellows Packless Angle, No. 868	Toyish
Valves, Bellows Packless Angle, No. 872	Toywort
Valves, Bellows Packless R.H. Corner, No. 863	Trabal
Valves, Bellows Packless L.H. Corner, No. 864	Trachea
Valves, Bellows Packless Globe, No. 869	Trachyte
Valves, Boiler Drain, No. 171	Trackless
Valves, Gas, Snap-Acting, No. 791	Tractor
Valves, Packless Hot Water, Angle, Round Handle, No. 901	Trailer
Valves, Packless Hot Water, Angle, Lever Handle, No. 904	Trammer
Valves, Detroit Steam Angle, No. 72	Trenchant
Valves, Detroit Steam R.H. Corner, No. 32	Trespass
Valves, Detroit Steam L.H. Corner, No. 37	Trevat

ACCESSORIES CODE

Continued

	Code Word
Valves, Detroit, Hot Water, No. 101	Triad
Valves, Gate, No. 373	Tribal
Valves, Globe, No. 57	Triceps
Valves, Pop Safety Arco, No. 420	Trickery
Valves, Pop Safety Vapor, No. 421	Tricolor
Valves, Relief Arco Compound, No. 984	Triddler
Valves, Thermosnap Gas, No. 833	Trifid
Valves to be Equipped with Lock and Shield	Trigger
Water Gauge, Packless, No. 351	Trilby
Wrenches, Spud, Style 1	Triumphal
Wrenches, Spud, Style 2	Trolling

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